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Fenchurch Street Electrification Announcement

THE joint scheme of London Transport improvement in which the London Passenger Transport Board and the London & North Eastern and Great Western Railway Companies are interested was outlined on Tuesday, March 24, when the case for the three Bills promoted by these systems was opened before a Select Committee of the House of Commons presided over by Sir Henry Cautley. A very important addition to the £35,000,000 scheme which was described and illustrated in THE RAILWAY GAZETTE of June 7, 1935, and was further explained on page 1229 of the issue of June 21, has now been made by the proposal to electrify the L.N.E.R. as between Fenchurch Street and Stratford. This has received the approval of the Minister of Transport, and the whole scheme as now presented, including a connection between the L.N.E.R. and London Transport lines at Edgware and certain additional works, will represent an expenditure of about £42,000,000. A considerable part of the scheme has already been sanctioned by the London Passenger Transport Board Act, 1935, under which the board was empowered to borrow £10,000,000. In the Bills now before the Committee the London Passenger Transport Board is seeking powers to borrow a further £20,000,000, the London & North Eastern Railway £10,000,000, and the Great Western Railway £2,000,000 from the London Electric Transport Finance Corporation. In its present form the enlarged scheme involves the construction of about 12 miles of new tube railway, the electrification of about 48 route miles of suburban line, and the doubling and electrification of about 12½ more miles.

The Value of Travel

At least one holiday abroad a year is prescribed for every business man by Mr. E. Huskisson, Manager, Thomas Cook & Son Ltd., in an article recently contributed to *Trends*. But it is not only the business man who can profit from seeing common problems approached in new ways, from noticing facilities that might profitably be introduced at home, or from discovering openings for a wider sale of the products of his own enterprise. All these experiences can be enjoyed by those whose business is the provision or sale of railway transport, and in their case there is an extra inducement to pursue them in that the time actually spent on the journey is as valuable as that devoted to studying the places visited. We have no fear that extended opportunities for travel would nourish the superstition that what is foreign must necessarily be good, an attitude of mind rarely accompanied by a zest for making our own institutions better. Travel, on the other hand, teaches the art of appraisement and selection, at the same time stimulating the traveller's interest and pride in his own duties. We have already referred to the overseas tours to this country and the Continent organised for employees of the Canadian National Railways. Less lengthy journeys could be arranged for our own railwaymen. Indeed, there is enough individuality of practice in the different areas of the four groups for profit to be derived from educational travel within these islands.

* * * *

The Week's Traffics

Very satisfactory traffics were shown by the four group railway companies last week, particularly by the two northern lines. The total increase for the week was £116,000, comparing with one of £57,000 for the previous week. Towards the current gain passenger train receipts contributed £40,000, merchandise £75,500, but coal only £500. Percentage increases for the year to date are higher on the L.M.S., L.N.E., and Southern Railways than they were at the end of the previous week, and that of the Great Western remains the same. Gross takings of the four companies for the 12 weeks amount to £32,643,000, an increase of £897,000 or 2·83 per cent., which compares with an increase of 2·69 per cent. at the end of the 11th week. There are substantial increases in the passenger train receipts of the two northern companies for the past week.

	12th Week				Year to date	
	Pass., &c.	Goods, &c.	Coal, &c.	Total	Inc. or Dec.	
	£	£	£	£	£	%
L.M.S.R. ..	+ 17,000	+ 35,000	+ 1,000	+ 53,000	+ 403,000	+ 3·12
L.N.E.R. ..	+ 13,000	+ 29,000	+ 2,000	+ 44,000	+ 293,000	+ 3·05
G.W.R... ..	+ 4,000	+ 10,000	− 3,000	+ 11,000	+ 130,000	+ 2·46
S.R.	+ 6,000	+ 1,500	+ 500	+ 8,000	+ 71,000	+ 1·81

London Transport receipts for the past week were £546,200, an increase of £17,100, and for the 38 weeks amounted to £20,610,500, an increase of £380,500. Irish traffics have shown a slight improvement during the week.

* * * *

Pennsylvania Railroad Results

Railway operating revenues of the Pennsylvania Railroad in 1935 showed an increase over 1934 of $24,143,486, or 7 per cent. All the principal items of revenue, except express, showed improvement, and passenger earnings registered a gain for the second successive year. In railway operating expenses, notwithstanding the exercise of most rigid economy, there was an advance of 7 per cent., chiefly due to higher wages and fuel costs, and increased expenditures for maintenance of track and equipment. Taxes were again higher and absorbed nearly 7 cents out of every dollar of revenue. Net railway

operating income was $7,063,111 higher, and total net income increased by $2,215,833. The dividend on the capital stock has been raised from 1 per cent., or 50 cents, for 1934 to 2 per cent., or $1, for 1935. Some results for the two years are compared in the accompanying table:—

	1935	1934
	$	$
Gross earnings	367,812,186	343,668,700
Operating expenses	266,201,135	248,786,108
Net railway operating income	70,394,641	63,331,530
Net income	23,849,798	21,633,965

Better business conditions prevailed during the last five months of the year. Moderate increases in freight rates were granted by the Interstate Commerce Commission on certain classes of commodities, and these took effect on April 8, 1935. They will expire on June 30 of this year.

* * * *

Overseas Railway Traffics

Central Argentine Railway traffics for the past week were weakened by four wet days and a hold up of maize due to increase of basic price and in the past fortnight they have gone down to the extent of £12,314. Buenos Ayres & Pacific receipts during the same period have gone up £6,578, but on the Great Southern there has been a fall of £59,605 and on the Western one of £3,782. Amongst Brazilian railways the San Paulo for the first eleven weeks of the current year registers an increase of £70,561, and the Leopoldina for the first twelve weeks has a gain of £7,282, but the Great Western is £9,500 down for the twelve weeks notwithstanding an advance in currency of 1,186 contos.

	No. of Week	Weekly Traffics	Inc. or Decrease	Aggregate Traffic	Inc. or Decrease
		£	£	£	£
Buenos Ayres & Pacific	38th	101,586	− 70	3,104,859	+ 268,943
Buenos Ayres Great Southern	38th	143,537	− 35,943	4,960,497	− 485,641
Buenos Ayres Western	38th	48,179	− 2,087	1,685,925	+ 12,247
Central Argentine	38th	107,638	− 10,180	4,587,355	+ 108,681
Canadian Pacific	11th	528,200	+ 87,600	4,731,600	+ 458,000
Bombay Baroda & Central India	51st	278,700	+ 40,200	8,109,150	+ 41,700

The Canadian Pacific has during the past fortnight increased its gross earnings by £121,800.

* * * *

Brooklyn-Manhattan Transit Corporation

This is a holding company which controls an extensive system of rapid transit (subway) lines, trolley (tramway) lines, and bus routes in the three boroughs of Manhattan, Queens, and Brooklyn in New York City. Control is exercised through holdings in the New York Rapid Transit Corporation, the Brooklyn & Queens Transit Corporation, and the Brooklyn Bus Corporation. Operating results secured by the company and its subsidiaries during the fiscal year ended June 30, 1935, were adversely affected by general business conditions and by increasing competition from the New York Independent Subway system owned by the city and operated by its Board of Transportation.

	1934–35	1933–34
	$	$
Operating revenue	51,555,084	52,599,376
Operating expenses (including depreciation)	32,726,725	32,352,561
Net operating revenue	18,828,359	20,246,815
Taxes	4,559,040	4,180,048
Operating income	14,269,319	16,066,767

Operating expenses increased $374,164. The average cost of coal per ton was approximately 13 per cent. higher, with a resulting increase of $251,408 in the cost of fuel for power, notwithstanding a decrease in the amount of current consumed. Increases in wages were also made. On rapid transit lines the number of passengers carried in 1934-35 was 598,235,501, a decrease of 1·40 per cent., and on all lines the number was 1,012,392,638, a decrease of 2·1 per cent.

A Fast Inter-Capital Service

The article on French railway speeds, which appears on page 630 of this issue, draws attention to what is probably the fastest train service in the world connecting two capital cities. It is that in operation between Paris and Brussels, which provides a total of ten trains daily, over a route 193·1 miles in length, at a mean average speed of 57·9 m.p.h. Four of the trains, two in each direction, composed of Pullman cars, make the run without intermediate stop; and the fastest of them—the northbound Blue Bird Pullman—brings the two capitals within exactly three hours of each other by a start-to-stop speed of 64·4 m.p.h. There are other interesting features about this service. One is the penetration of the locomotives of the Northern Railway of France some fifty miles into Belgian territory, in order to reach Brussels; three of the through trains in each direction are worked thus by the Nord, but the remaining two are taken over by the Belgian National Railways between Aulnoye, nine miles on the French side of the frontier, and Brussels. The Belgian locomotive work required on these trains is of all but as high a standard as the French, for one of the runs from Aulnoye to Brussels, including a severe slack through Mons and other speed reductions, is performed at 59·2 m.p.h., and the other at 58·2 m.p.h. Within the Belgian frontiers, also, 25 runs, totalling 858 miles, are performed daily at speeds of 58 m.p.h. and over, including eleven runs at 62·6 m.p.h. from start to stop.

* * * *

Railway Carriage Ventilation

In this country the time has not yet arrived for providing passenger carriages with what we are convinced is the only completely satisfactory method of ventilation, namely, air-conditioning. That, we believe, will come in time, but at the moment the prohibiting factor is expense. Air-conditioning includes not merely the filtering and supply of fresh air at an equable temperature, but also the regulation of its humidity. It has become almost universal in the U.S.A., where conditions are far different from ours, on long-distance express trains, and probably the first step in this country will be to equip such vehicles as sleeping, dining and Pullman cars. Meantime the question of ventilating ordinary passenger stock is one that up till now has not been really satisfactorily answered. On another page, however, we describe a new type of carriage ventilator with which some of the latest rolling stock on the Southern Railway is equipped. This is not an expensive ventilator, but from personal observation it appears to us to be very effective in operation. On a recent journey in a dining car equipped with these ventilators, although the weather was cold, we were much impressed by the fact that the air in the car remained fresh yet warm. Only a few of the ventilators were opened, and it appeared that, according to the temperature prevailing outside, the same effect could be obtained by regulating the number of ventilators brought into use. We understand that the new electric rolling stock to be built for the Portsmouth services is to be equipped with these ventilators.

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Studying the Effects of Frost

On several sections of the Norwegian State Railways, especially the Kongsvinger line between Lilleström and Charlottenberg on the main route from Oslo to Stockholm, much trouble is experienced in winter through frost distorting the roadbed, necessitating a great deal of work in providing supports for about 10 per cent. of the sleepers and bringing the track into a satisfactory

condition again. On some parts of the line the proportion of sleepers needing special packing is at times even higher. In one year as much as 40,000 Kroner has had to be spent on the work. Herr Hermann Fleischer, the engineer responsible, has been systematically investigating the action of frost in the ground with a view to devising effective means of dealing with the trouble. It would be worth spending a good deal of money to eliminate it. Careful measurements of the displacements produced have been made throughout the route, combined with investigations of the composition of the ground from point to point, the ground water level, and other details. Trial squares of earth, of various compositions have been subjected to frost action and the results studied, and a special apparatus has been constructed to enable different kinds of soil, contained in insulated tubes, to be tried side by side under any conditions of temperature change from above and below, heat being applied beneath from an electric lamp in a container. The researches, begun in 1934, are being continued during the present winter, and the results should be of much interest to permanent way engineers.

* * * *

The "Queen Mary" and Southampton

It is fitting that an island people with a great maritime tradition should give an enthusiastic send-off to its largest and most notable mercantile steamship, and the events along Clydeside on Tuesday (to which we refer on page 639) gave ample testimony that this enthusiasm is not lacking. Even larger crowds will undoubtedly take advantage of the extensive opportunities provided by the Southern Railway for viewing the *Queen Mary* at Southampton both today (Friday) when she arrives for the first time at her European base, and also on the subsequent days. Here there is a double attraction, for not only will this magnificent Cunard White Star vessel of 80,773 gross tons be on view, but also will be seen the "King George V" graving dock built by the Southern Railway for her accommodation. It will be recalled that when the building of the *Queen Mary* began, in December, 1930, there was no suitable graving dock in the British Isles to accommodate her. The Southern Railway therefore decided to build a dry dock, as the Southampton floating dock was not capable of dealing with the new liner. In order to be ready for the *Queen Mary* (on her original building schedule), it was necessary to build this dock in eighteen months, and exceptional arrangements were therefore required. The cost of this enterprise was in the neighbourhood of six million pounds. In December, 1931, work on the ship was suspended, but the directors of the Southern Railway decided to carry on with the graving dock. It was opened in July, 1933, by King George V.

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Signal Maintenance in Switzerland

In countries subject to severe winters, with heavy falls of snow, the maintenance of the signal apparatus calls for special care to eliminate dangerous irregularities, and to avoid delays. The Swiss railways have naturally had a long experience of these difficulties, and, in spite of the generally high quality of their signal apparatus, derangements still cause trouble from time to time, both with mechanical and power signalling equipment. This led the 3rd Division of the Swiss Federal Railways at Zurich to undertake a special inquiry into the subject, covering the period from November 1, 1934, to February 28, 1935, each station sent in a list of all failures and irregularities, which totalled 485, affecting in all 650 trains. These faults were made up as follows: influence of cold, snow and ice, 208; defects in the apparatus, 135; defective manipulation, 83; work in hand, 16; poor maintenance, 11; bad lighting, 10; and no cause found, 22. These figures proceeded from 175 stations, and 83 stations had no failures at all. Inquiry elicited the fact that the staff at the latter took special measures on the approach of bad weather, kept the wires and other equipment free from snow and ice, and paid particular attention to lubricating all the parts, periodically moving the signals and points. The experience gained at these stations has been made known to the others, and explained in an article by Herr Wahrenberger in the *Bulletin of the Swiss Federal Railways*.

* * * *

Improved Coaching Stock in India

There recently appeared in the columns of our contemporary, *Indian Engineering*, particulars of a new and improved design of third class railway coach which has been completed for the Indian Railway Board. Each coach has six compartments with seating accommodation for sixteen passengers in each, and is provided with six lavatories. The total seating capacity of 96 compares with 114 in the present standard designs. More comfortable seats and seat-backs have been fitted, and the electric lighting of the coach is improved. An additional alarm handle has been placed on each side of the compartments, and special attention has been paid to ventilation, there being three air extractors in each compartment. One compartment or more can be reserved for parties, for further privacy, whilst luggage racks are fitted above each seat, and can be used for lying down. The water capacity of the coach has been increased from 250 to 400 gallons, a feature which has necessitated water being carried in tanks placed underneath the coach. Each vehicle is 68 ft. long by 10 ft. wide, and mounted on a standard underframe. The body is built of teak with steel panels, and the moulding of the interior has been finished as smoothly as possible so that dirt and dust will not accumulate. The sample coach inspection by the Central Advisory Council for Railways will be open to criticism and suggestions from the travelling public prior to the design being adopted as the future Indian standard.

* * * *

The Balancing of Locomotives

There is much scope for debate upon methods of balancing locomotives. In this country it has been the rule to balance the whole of the revolving weights plus from 50 per cent. to 66·6 per cent. of the reciprocating weights, although in certain four-cylinder engines the latter percentage has been reduced to 40 per cent. As the demand for higher axle loads has become more urgent, increased attention has been paid lately to reducing hammer blow by cutting down the proportion of reciprocating parts that are balanced. In America, and in some recent very large passenger engines supplied to South Africa, the percentage was allowed to drop as low as 20, whilst it was even suggested in some quarters that no balancing at all was needed for the reciprocating parts. As Mr. E. S. Cox pointed out when replying to the discussion on the paper he read before the Institution of Locomotive Engineers on "Locomotive Wheels, Tyres and Axles," history is here repeating itself, for the earliest locomotives were balanced for revolving masses only, and it was not until 1845 that engineers were driven by rough riding and derailments to introduce balancing of the reciprocating weights as well. The facts seemed to be that when newly out of the shops almost any engine would run reasonably well without reciprocating balance for a week or two, but as play and wear began to take place, the lack of balance was reflected in rough riding and unsatisfactory running if the engine was light in weight or had a short wheelbase.

Calendar Reform

ON March 4 Lord Merthyr asked the Government whether it was proposed to take any steps to accelerate, at the forthcoming meeting of the Transit Section of the League of Nations, the adoption by international action of a fixed calendar. The principal features of the present calendar which the protagonists of calendar reform seek to modify are: inequality in lengths of months; splitting of weeks at beginning and end of months and years; lack of fixity of week-day names to dates; and the non-fixity of Easter. The shifting nature of the present calendar is well illustrated by the fact that an exact reproduction can take place only every 28 years. These defects have resulted in complications in the reckoning of accounts and the analysis of business, scientific, educational, health, and other statistics based on the time element. The unequal divisions also preclude genuine statistical comparison between one month and another, thus detracting from the value of many of the statistical data to which railways and other commercial concerns attach so much importance. Many authorities have endeavoured to obviate the last named disadvantage by dividing the year into thirteen accounting periods of four weeks each, thus avoiding distortion of comparative statistics. The four group railways of Great Britain, together with the L.P.T.B., are among the many users of this system. Even so, many four-weekly comparisons remain vitiated by the non-fixity of Easter and Whitsun, each of which move within a period of five weeks.

Apart from statistical considerations, the date of the Easter holiday is of special importance to seaside resorts and railways. As the first of the three short vacations of the year, Easter is a popular holiday period and brings much valuable revenue to transport, hotels, and other interests. It is said that when Easter falls in March there is less likelihood of settled weather, resulting in serious loss of business. Nevertheless, in actual experience, we believe the present variability has resulted in a higher average of fine weather than might prevail if Easter were always to fall upon a fixed date in the year. There is at least a sporting chance about it, similar to that gambled on by the French railways which include insurance against rain in certain holiday and excursion tickets. Fundamentally, Easter is a religious festival, but since the authorities of the Eastern Orthodox Churches and various non-Roman Catholic Churches have already signified their willingness to fix Easter Sunday about April 9 and Whit Sunday on May 28, as recommended by the League of Nations, considerable progress has been made towards overcoming religious scruples. So far as this country is concerned, there is already in existence an Act of Parliament (the Easter Act, 1928) which provides that Easter Day should be the first Sunday after the second Saturday in April. So far, however, the Government has not seen its way to implement this Act.

On the general question of calendar reform, there are two schools of thought. One of these advocates an "equal-quarters" plan under which each quarter-year would be composed of 91 days by grouping three months of 31, 30, and 30 days. It is claimed for this scheme that it would provide a balanced structure with fewer changes than would be involved by the division of the year into thirteen equal months of 28 days. This scheme would not, however, remedy two variable features of the present calendar, namely, the fractions of weeks which begin and end months, and the change of day names for the same numbered dates in following months and years. As a unit of time, the quarter is used far less than the month and there appears to be much greater advantage in the scheme which provides for thirteen equal months, each month being directly comparable with all other months, both in the same year and in preceding and future years. Features of this scheme, which is sponsored by the International Fixed Calendar League, are the interpolation of a new month after June, to be known as "Sol," and the institution of "Year-day" on December 29 to account for the 365th day of the year. The additional day occurring in leap-years would be covered by the insertion every fourth year of "Leap-day," on June 29. Many prominent organisations have passed resolutions in favour of a 13-month year and the fixation of Easter, and we believe the proposals have gained a certain measure of support in railway circles. Whether or not any further progress can be made must depend, in large measure, upon the deliberations of the League of Nations experts. However, the mathematical complexities of our present months have inspired at least one literary work without which we should be the poorer. "Thirty days hath September" is a poem as universally familiar as any in the language, and has a simple and incontrovertible directness which few of us care to dispute. We wonder whether equal authority would attach to a revised version beginning: "September, sanctioned by Geneva's laws, adopts perforce the standard seven fours." For our own part we cannot help feeling that a perfectly uniform calendar, whatever its advantages in other directions, would have a somewhat monotonous effect in practice, eliminating entirely any element of variety or unexpectedness. We grumble, for example, at the vagaries of our own climate, yet we seem to prefer the variableness of English skies to the uninterrupted cloudless glare of more favoured lands. So might it be with fixed holidays and a standardised calendar.

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Canadian Pacific Railway

OPERATIONS for the year 1935 resulted in an improvement of $145,953 over the comparable figure for the previous year, although the net earnings from railway business, including "express" and dining and sleeping car services, showed a decrease of $1,986,499. On the other hand from what is now called "other income—net," the company received in 1935 $8,145,494, as against $6,663,793 from "special income" in 1934. This "other" or "special" income is derived from sources other than railway operations and lands, and includes profits from ocean and coastal steamships and from hotels, besides dividends from investments in other undertakings. In 1935 the $2,832,084 balance of income account transferred to profit and loss account was arrived at after deducting $3,550,997 for steamship depreciation, whereas the corresponding balance of $6,469,791 in 1934 had been reached without deduction of $3,783,660 for steamship depreciation, which was charged to profit and loss account and surplus revenue account in that year. On a strictly comparable basis therefore the ultimate results for 1935 was the improvement above-mentioned.

During the first eight months of the year there was a slight decrease in earnings, but a definite improvement set in later and for the whole year there was an increase of $4,135,950 or 3·3 per cent. Passenger earnings were down $3,090, but freight earnings advanced by $2,959,778 or 3·1 per cent., and the returns from sleeping, parlour, and dining cars, express and miscellaneous were 10·15 per cent. better. In freight earnings there were moderate increases from coal, paper, refinery and smelter products and substantial increases in lumber, woodpulp, and petroleum products. The earnings from grain and grain products again showed a reduction, being lower than in any year since 1914. Working expenses (includ-

ing taxes) increased by $6,122,449 or 6·1 per cent. Revision of the scale of deductions from basic rates of pay applicable to officers and employees caused an addition of $3,068,000 to the working expenses of the year. During the early part of the year extraordinary snow and flood troubles in British Columbia entailed heavy expenditure for maintenance and the re-routing of trains. Some railway operating figures are compared in the accompanying table:—

	1935	1934
Miles open	17,289	16,986
Train-miles	34,952,519	34,453,837
Passengers	7,423,634	7,592,802
Tons, revenue freight	26,094,183	25,606,063
Average haul, miles	403·22	391·57
Operating ratio, per cent.	82·73	80·58
	$	$
Freight earnings	98,375,515	95,415,437
Passenger earnings	15,155,639	15,158,729
Gross earnings	129,678,904	125,542,954
Working expenses	107,281,380	101,158,931
Net earnings	22,397,524	24,384,023
Total income	30,543,018	31,047,816

The mileage open at the end of 1935 was increased by the completion of lines in Saskatchewan and Alberta which were under construction at the end of 1934, but 21 miles were abandoned during 1935 and the abandonment of 50 more miles will be proceeded with during the present year. Net earnings of steamships before depreciation increased $560,475, but net earnings from hotel, communication, and miscellaneous properties decreased $178,246. Owing to the continued serious losses in the operation of the Place Viger Hotel, Montreal, which showed no prospect of improvement, the directors found themselves compelled to close it on September 30 last.

As already announced, the directors, in view of the necessity for conserving cash resources of the company to meet necessary expenditures, including advances of $4,910,085 to the Soo Line, did not deem it advisable to declare any dividend in respect of the year 1935. For 1932 only 2 per cent. was paid on the 4 per cent. preference stock, when nearly all of this payment was charged to surplus. Since then this stock has received no dividend at all. As the result of an arrangement with the Dominion Government, the company will acquire this year 1,120 freight cars, 16 lightweight passenger cars, 5 lightweight passenger locomotives, and one diesel-electric shunting locomotive. The amount involved is $5,730,000. The company will have the use of the stock, will reimburse the Government for the full amount of its cost in thirteen annual instalments commencing in 1938, and will acquire title upon payment of the final instalment. No interest will be payable in respect of the first two years, after which it will accrue at the rate of 4 per cent. per annum. The annual economy anticipated from co-operative arrangements with the Canadian National Railways is slightly less than $1,600,000, one half of which will accrue to each company.

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Lightweight Rolling Stock

IT is often difficult to determine the precise time at which any new method passes from the experimental stage into that of accepted practice, but the time arrives when, on taking stock of the existing state of affairs, it becomes obvious that the border has been crossed. These remarks are prompted by the attention which is at present being given in many parts of the world to the use of light alloys for railway rolling stock, as it is scarcely controvertible that aluminium can no longer be considered an experimental material for the heaviest types of passenger and freight vehicle construction. The extent to which aluminium alloys may be used for building railway rolling stock is limited only by the requirements of present-day engineering design; and whether vehicles are built entirely of aluminium or this metal is used jointly with others, is determined entirely by the economical considerations which should always govern such design. On another page we publish an article by Mr. Ernest V. Pannell on the use of aluminium in rolling stock construction, which sets out the main considerations affecting the adoption of such methods and also gives a useful summary of recent progress both in Great Britain and abroad. A valuable companion to this article was recently published in the columns of our American contemporary, the *Railway Age*, in the form of a review by Mr. A. H. Woollen of the Aluminium Corporation of America of 13 years' experience with the strong alloys of the metal, both in rolled and extruded forms.

Mr. Woollen has made the present time the occasion of his review, as it was 50 years ago last month (February) that Mr. Charles Martin Hall discovered the electrolytic process for the production of aluminium, a process that is the basis of its commercial production today. Hall's discovery made possible the manufacture of aluminium at a material reduction in price, and, as a result, the extensive use of the metal was immediately envisaged. So far as rolling stock was concerned, development was slow, as conservative application of light alloys was rightly considered preferable to an attempt to launch a new material into railway service for many diversified uses without definite knowledge of its performance and with little research background. Although some aluminium was used in passenger carriage construction during the early part of the twentieth century, it was confined to the low-stressed parts of the car interior. This was primarily a period of transition from wood to steel, and the first all-steel Pullman car was exhibited at the Jamestown Exposition in 1907. Two years later Mr. Alfred Wilm announced the development of a heat-treated strong aluminium alloy designed primarily for lighter-than-air craft, but soon applied extensively to the primitive heavier-than-air craft. As Mr. Pannell remarks on page 613, the first important use of aluminium for railway coaches was probably that made by the Lancashire & Yorkshire Railway about 1910, when Mr. George Hughes, then Chief Mechanical Engineer, showed that the use of light metal panels for the electric coaches on the Liverpool-Southport line was responsible for a distinct saving not only of weight but of energy consumed.

The first major strength application for the metal came in 1923, when the Illinois Central built 25 suburban passenger cars with strong aluminium alloy roof sheets. Aluminium was also used in the interior finish, doors, and conduit and boxes for electrical wiring, but these uses were so well established that they could not be considered experimental. On the other hand, the roof sheets, representing an entirely new use of aluminium, required special development in manufacturing technique, application engineering, and shop practice. Shortly afterwards, the Pennsylvania Railroad decided to build eight multiple-unit passenger cars in which aluminium alloys would be used to the maximum extent practicable necessarily limited by the aluminium fabricating equipment of that day. As a result, the entire car bodies above the side sills were of aluminium alloys. The Pennsylvania Railroad desired to form the metal in the same dies which were used for steel in previous cars of the same type, and this necessitated the development of a process combining the hot-forming of the metal with heat-treatment. These early applications were naturally watched carefully, for

they represented the beginning of the lightweight movement in railway work. Up to 1931 many additional applications were made of aluminium to strength members, and in the U.S.A. today more than 400 passenger carriages are in successful operation which were built during the eight years of development. The results indicated that such alloys could be used with safety for both body and underframe—a conclusion of first importance, for railway administrations were obviously loth to save weight at the risk of their high safety records. Actually, as our contributor states on page 614, lightweight rolling stock has certain material points in its favour in connection with collision damage. High-speed streamlined trains had their commercial origin in 1933, when Mr. W. A. Harriman of the Union Pacific called upon his engineers to develop a train which would combine many of the desirable features of the train, the bus, the private motorcar and the aeroplane. Their ideas were embodied in the Kansas Streamliner, which was built of aluminium, except for the bogies and end sills. This pioneer unit, placed in service on February 12, 1934, is now in successful operation. For high-speed diesel trains, weight reduction became even more important than for conventional steam-hauled stock, and within the last few years new steel alloys have also been developed, giving the designer additional materials with which to work, provided cross sections are reduced sufficiently to offset the higher specific gravity—that of aluminium is 2·7 and of steel 7·8. Streamlined, high-speed aluminium trains at present working in the U.S.A. include three- and seven-car trains of the Union Pacific, the three-car train of the New York, New Haven & Hartford, and the eight-car train of the Baltimore & Ohio. The Baltimore & Ohio train, while streamlined, differs from the others in that it is not a special type train hauled by a limited power plant. Four additional aluminium-alloy trains are now being built for the Union Pacific. There are, of course, many other examples of high-speed trains in the U.S.A., such as the stainless-steel trains of the Chicago, Burlington & Quincy and the Boston & Maine; and the Cor-Ten steel trains of the Gulf, Mobile & Northern, the Baltimore & Ohio and the Illinois Central; but even on these, aluminium alloys were employed for many parts of the car interior.

* * * *

Remarkable Beyer-Garratt Locomotives for Algeria

IT was in 1909 that the first locomotive built on the Garratt articulated system was completed at the works of Beyer Peacock & Co. Ltd., the sponsors of the principle from the beginning. It was a four-cylinder compound for the Tasmanian Government Railways, had the 0-4-0 + 0-4-0 wheel arrangement, weighed 33½ tons, and developed a tractive force of 14,380 lb. at 75 per cent. boiler pressure. What the intervening 27 years have done in the evolution of what is nowadays known as the Beyer-Garratt locomotive is strikingly exemplified by a study of the design of the latest engine constructed on this principle, and just recently completed in France; it is a semi-streamlined express passenger locomotive of the 4-6-2 + 2-6-4 type, weighing, in working order, 216 tons, and developing a tractive force of 65,849 lb. at 85 per cent. of the boiler pressure. This large and powerful machine represents the combination of the long and specialised experience of the British firm with the scientific research and developments undertaken by the Algerian Railways and a well-known French manufacturer of locomotives, rolling stock and other railway material. Its proportions apart, the locomotive just completed by the Société Franco-Belge de Matériel de Chemins de fer, at Raismes, France, for express passenger service on the main lines and over mountainous sections of the Algerian Railways (where Beyer-Garratt engines have already achieved remarkably successful results) is of outstanding interest on account of several special features of its design. Among these is the Cossart valve gear, making possible very early cut-offs and particularly free by-passing; the use of a turbo-generator and electric motors for reversing is another interesting departure. The design includes, moreover, a double chimney and variable double blast pipe, a very high boiler pressure, an unusually complete system of lubrication, a feed water heater, and dual control for driving in either direction.

These may be regarded as refinements, but nevertheless must produce more efficient and economical operation, whilst the value of the partial streamlining of the boiler and tanks may be judged from other ventures in this direction. With its twelve coupled wheels of nearly 6 ft. diameter, and four 19¼-in. × 26-in. cylinders fed with steam from a boiler of moderate length with large diameter barrel, a deep firebox, and large superheating area, to say nothing of the valve gear and exhaust arrangements already mentioned, the engine will be able to command an abundance of power at starting, plus rapid acceleration and the ability to run at really high speeds on the level with economy. These attributes are secured on what, in the light of modern ideas, is a very moderate axle loading, namely 18½ tons per axle for the coupled and bissel wheels. The locomotive is designed for a minimum curve of 120 m. (393 ft.) and the specification calls for a maximum speed of 75 m.p.h. on the straight and on curves of 750 m. (2,460 ft.), combined with good stability on 200-m. (656-ft.) curves at 50 km.p.h. (31 m.p.h.). These are regular service speeds for backward or forward running. There is, however, nothing new in these capabilities, as the original engine, with the same main characteristics, has done 81 m.p.h., and has exhibited, according to official reports, remarkable stability under all conditions.

Early in the present month we were able, at the invitation of Beyer Peacock & Co. Ltd. in England, and the Société Franco-Belge in France, to inspect and ride upon the locomotive, the first to be completed of an order for twelve, at the works at Raismes. The impression left upon us after closely inspecting the finished and the partly completed engines was that both of these concerns deserve unstinted credit for having produced a very remarkable locomotive which must rank amongst the most powerful and efficient passenger engines throughout the world. We tested for ourselves the ease with which this very large and powerful engine can be reversed, with a degree of nicety quite unusual, by means of the small lever actuating the electrically-operated reversing gear, and we noted the rapid powers of acceleration, and the interesting feature of the cam-operated piston valves remaining stationary while coasting. The commodious cab and footplate arrangements generally, and the dual control system for backward travelling, are also features to be appreciated, and last but not least we must comment upon the obvious care which has been taken in designing and manufacturing every detail of the locomotive. The twelve engines of the new series are to operate over the 550 miles of standard gauge track between Constantine, Algiers and Oran, where there is some heavy grading, and their performance will undoubtedly confirm the utility of their type where traffic calls for the haulage of loads beyond the normal. The characteristics and potentialities of this remarkable engine cannot, we think, fail to impress any locomotive engineer or railway operating department officer very favourably.

PUBLICATIONS RECEIVED

Enginemen's Mutual Improvement Class Papers, 1935. London: *L.M.S.R. Magazine*, Labour and Establishment Office, Euston Station, N.W.1. 9½ in. × 7¼ in. 16 pp. Price 4d., post free.—Following the very commendable course adopted last year, the *L.M.S.R. Magazine* has again re-issued in book form the latest series of articles specially written for the use and interest of Enginemen's Mutual Improvement Classes. The subjects dealt with during the past year, and here included, cover diesel locomotives (two articles on which are from the pen of Mr. D. C. Urie, Superintendent of Motive Power, L.M.S.R., who also contributes a foreword); drivers' brake valves; Walschaert's valve gear; and exhaust steam injectors. Throughout, the treatment is essentially practical, and its value is enhanced by the clear diagrams. At the modest price of fourpence, including postage, these papers are easily available, and should prove of help to many enginemen.

Swiss Railways Calendar.—The interest of the Swiss Federal Railways calendar lies not only in its many excellent and artistically conceived photographic reproductions—one for each week of the year—but in the captions which accompany them. These present a very varied and readable survey of railway operations and facilities in Switzerland. Perhaps that for the last week of December, appearing beneath a view of the station at Berne after a heavy snowfall, is most typical of the spirit of service to the public in face of natural and other obstacles which is expressed by the calendar as a whole. The caption reads: "It has been snowing for more than sixty hours, and the cold is bitter. Road and air traffic is at a standstill, but the trains are still running to time as if conditions were normal. Fortunately, there is one transport service which is not held in the grip of the weather."

Lightweight railcars are the subject of two illustrations this year, and the daily distance covered by such services is given as some 500 miles, "often at meteoric speeds." These cars, popularly known as "red arrows," are used for fast connectional services with long-distance trains, and for speeding up local communications. Another subject referred to on several pages is the protection or abolition of level crossings. The number of crossings in Switzerland averages 249 per 100 km., all of which are protected either by keepers or by automatic warning devices. Many of them have been equipped with overhead notices and indicators drawing the attention of drivers of heavily-laden lorries to the height of the electric transmission lines. Bridges have replaced 1,300 level crossings on the Swiss Federal Railways in the past thirty years.

Here and there users of the calendar are given good counsel regarding their conduct on railway journeys, notably in such minor but important points as remembering to buy their newspapers in good time instead of hailing the vendor at the last moment and robbing the rest of the train of his services. Christmas week brings the reminder that an acceptable gift is a travel voucher, which can be exchanged for a ticket of the same value at any time during the ensuing year.

British and Continental Travel.—Pickfords Travel Service, 205-206, High Holborn, London, W.C.1, sends us two illustrated booklets of tours and holidays in 1936. "British Holidays" is a convincing and readable argument in favour of the traveller enlisting the services of experienced organisers when planning a holiday in his own country, for however much the desirability of seeing Britain first is advocated, it is a characteristic of many of those who are most energetic in their sightseeing abroad to be most lethargic and unimaginative when it comes to spending a fortnight in a British holiday area. This is less to be wondered at when it is remembered how many people can conceive of no other means of locomotion at home than in their own motorcars, which has long since ceased to make motoring a holiday for those who are called upon to drive. Pickfords comes to the rescue of the family hack with an engaging vista of interesting travel by rail and road in which the responsibility is shifted elsewhere, and he has only to enjoy the comfort and admirable planning. The Continental booklet adds the air to the media of travel offered, and also revives an ancient custom—the European "grand tour," without which no young man of birth in the Eighteenth Century was considered fully equipped.

The First Twenty Years of Railroads in Connecticut. By Sidney Withington. Yale University Press, New Haven, Connecticut, U.S.A. Published for the Tercentenary Commission of the State of Connecticut. 9 in. × 6 in. 32 pp. + 2 inset plates and map. Price 25 cents.—The Committee on Historical Publications of the Connecticut Tercentenary Commission has arranged to issue, during the next few years, a series of small pamphlets on a great variety of topics, and already some 45 have been published. The brochure we have before us, which is the first in the series to deal with railway transport, is a well-written and useful essay which naturally makes the reader wish for companion pamphlets on later developments. In Connecticut, as in most of the eastern States, the earliest railways were planned as links in a chain of combined land and water transport, and therefore we find that the two pioneer lines in this territory were highly competitive although they nowhere touched the same town and ran in different directions. The New York and Stonington Railroad was chartered in 1832 and opened in November, 1837; the Boston, Norwich and New London (afterwards Norwich and Worcester) Railroad, also authorised in 1832, was opened in March, 1840. Both were designed to facilitate through Boston to New York traffic, running in connection with steamboats working from a Connecticut port to New York in the sheltered waters of Long Island Sound. From these beginnings the story is taken up to 1859 when the early period of construction was complete. A railway map of the State is included which shows the year of opening of every line and also differentiates pre- and post-1859 construction. Among the many interesting facts recounted is the introduction in 1840 by the Norwich and Worcester Railroad of parlour or drawing-room cars in which the apartment for ladies was "carpeted and in every respect beautifully finished with wide and convenient sofas, dressing table, washstand, and other arrangements for the comfort of the passengers." As this pamphlet is an intelligent history and not a mere record of dates, we realise that this luxury was justified on a line which was really a link in the New York and Boston through route and not merely a local railroad—such helpfulness is characteristic of the whole essay.

Aluminium Sheet, Strip, and Circles.—The British Aluminium Co. Ltd., Adelaide House, King William Street, London, E.C.4, has published a second edition of the booklet "Aluminium Sheet, Strip, and Circles," which we reviewed in our issue of March 22, 1935. Various patterns of aluminium matting are also listed.

V-Rope Drive.—In referring in our issue of March 6 to the small losses incurred in power transmission by V-rope drive, we inadvertently quoted the percentage of efficiency of Veeteon belting as 85 per cent. We are advised by the maker, Fleming, Birkby, and Goodall Limited, of Halifax, that the correct figure is 98·5 per cent., so that only from two to four per cent. of the generated power is absorbed by the drive.

D.C. Polarised Relay.—The Siemens & General Electric Railway Signal Co. Ltd., Central House, Kingsway, London, W.C.2, has published a circular (No. 113) describing a new d.c. polarised relay for block proving circuits, distant signal proving, and similar purposes. The instrument, which is of robust construction and embodies the results of extensive research, is of the moving iron type with a highly retentive cobalt steel magnet. It is available with a two- or three-position non-stick, or two-position magnetic stick armature. The coil is wound to any value specified, and may be either single wound or double wound for differential working. An inspection window giving a clear view of the contacts and armature is incorporated in the substantial and dustproof bakelite case.

THE SCRAP HEAP

At Stroud a brown horse of the L.M.S.R., officially known as "No. 1129" was withdrawn from active work, and his driver tied the following notice to him:—

The best of friends must part
My number is 1129 and my name is *Prince*
I require no whip or stick.

* * *

The popularity of G.W.R. sleeping-car facilities has increased enormously in recent years, and making up the beds is now a whole-time job. This is undertaken by one of the regular sleeping car attendants; he works at Old Oak Common depot from 2.0 p.m. to 10.0 p.m. on week-days, and from 6.0 p.m. to 10.0 p.m. on Sundays. The daily average is about a hundred beds. A complete change of bedding is supplied in every case.

* * *

In the construction of the North British station hotel, Edinburgh, 13,000 tons of stone, 8,000,000 bricks, and 1,600 tons of steel girders were used. There are 26 acres of plaster work; 24 miles of cornices; and 15 miles of skirtings. The floor area is 6½ acres and there are altogether 2,000 doors and 1,000 windows. The hot and cold water and waste and ventilation pipes if put together would form a line 25 miles long. There are in all 61 baths and 75 lavatories, and a large portion of the water supply is stored in the tower. The four dials of the tower clock are each 13 ft. in diameter; the minute hands are 6 ft. 3 in. and the hour hands 4 ft. 6 in. long.

* * *

A friend and I have been bothered for some days by a little problem. A man leans out of the guard's van of a train with a rifle, intending to shoot the driver, who is leaning from the engine cab. Assuming that the rifle fires a bullet at a velocity exactly equal to that of the train, is it possible for him to shoot the driver? After long argument we are of the opinion that it would not be possible in these circumstances, as the bullet could never reach the driver.—*A Letter to the Editor of "The Daily Express" from Messrs. D. Cater and W. D. Thompson of Ventnor.*

Of course, it depends partly on the velocity of the train. At speeds below, say, 10 m.p.h., the driver would probably be none the worse.

* * *

EARLY RECOMMENDATION OF RAILWAYS

The vibration, or rather oscillatory motion communicated to the human frame . . . equalises the circulation, promotes digestion, tranquillises the nerves (after the open country is gained), and often causes sound sleep during the succeeding night. . . . The railroad bids fair to be a powerful remedial agent in many ailments to which the metropolitan and civic inhabitants are subject.—*From a contribution to the "Illinois Standard" (Jacksonville) of April 28, 1838, by a Dr. James Johnson.*

* * *

ACCIDENT RETURNS

A ganger in the west of Ireland was required to fill in an accident return concerning an accident to one of his men named Rafferty, upon whose foot a girder had fallen. This he did most carefully, but left the "Remarks" column blank. With the form he enclosed a covering note, explaining that he had not filled in the "Remarks" column because he did not know whether it was his own or Rafferty's remarks that were required. —*Told by Mr. W. V. Wood, Vice-President, Finance and Service Departments, L.M.S.R., at the annual dinner of the Permanent Way Institution on March 21.*

* * *

METERED HEATERS

The little gas radiator at Westland Row railway station, Dublin, has become quite a popular meeting-place for travelling companions, who on these cold, wintry days are grateful for its free warmth. I noticed a girl the other day drying her gloves before its pleasant beams, and I am sure that many other people look forward to a moment's comfort within the radius of the heat of the glowing rays. Late-comers seem very disappointed on finding that several earlier arrivals have occupied all the heated area in front of the radiator. One gentleman, I hear, often misses his usual train purposely in order that he may become nicely toasted before undertaking his homeward journey. This radiator suggests that it should not be beyond the genius of our inventors to contrive a penny-in-the-slot heater suitable for use in the street. It would be delightful on a raw, sleety day to pause for a few moments, and for the price of a mere copper slipped into a slot switch on an automatic radiator that would instantly light up and distribute its welcome warmth.—*From the "Irish Times."*

* * *

CALENDAR REFORM

The revived attention at the present time in the possibilities of calendar reform (see our editorial article on page 604) gives added interest to the following "Letter to the Editor" from Mr. T. H. L. Hony, of Fowey, which was published in the *Western Morning News* on March 18:—

SIR,—According to the West Greenock official register, James Watt was born on January 19, 1736. But it must be remembered that this entry was made in Scotland in the first half of the 18th century. It is equivalent to January 19, 1735, Julian calendar (old style), and January 30, 1736, Gregorian calendar (new style).

In 1600 Scotland adopted a portion of the Gregorian calendar, namely, that part which made the year begin on January 1 instead of on March 25, but the eleven days were not dropped. Hence the entry January 19, 1736.

The interesting question arises: How did people who were living at the time of the change of calendar in 1752 keep their birthday? Mr. S. B. Gaythorpe, F.R.A.S., of Barrow-in-Furness, quoting from a reliable authority, has supplied the answer. He says that after 1752 such people kept their birthday eleven days later, and it is practically certain that in and after 1753 James Watt kept his birthday on January 30.

Technically, therefore, the correct date on which to celebrate the bicentenary of James Watt was January 30, 1936. Until that date the 200 years had not expired. Centenary celebrations are, however, sometimes held on the old Julian date.

* * *

A feature of unusual interest in the early history of the Champlain & St. Lawrence Railroad—the first in Canada—was that the company issued its own paper currency. The scrip was of three denominations, 7½d., 1s. 3d. and 2s. 6d., and the values of the notes were shown in English, French, American, and Spanish terms. They were redeemable at the City Bank in sums of not less than 5s.; payment was made in bank notes current in the City of Montreal. A specimen, for which we are indebted to the Royal Bank of Canada, is reproduced below.

UNE ECU
LOWER CANADA.
CHAMPLAIN & St. LAWRENCE RAIL ROAD
2s. 6d.
HALF A DOLLAR REDEEMABLE AT THE CITY BANK
Pay to bearer Half a Dollar on demand
in current Bank Notes of this city & in sums not less than Five Shillings, Montreal 1st August 1837
2s. 6d.
3 FRANCS

A specimen of paper currency issued by the Champlain & St. Lawrence Railroad Company in 1837. This railway—the first in Canada—was opened on July 21, 1836, and therefore celebrates its centenary this year

OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

QUEENSLAND

First Half Year's Results

The gross earnings of the Government Railways for the six months ended December 31, 1935, showed a decrease, compared with the corresponding period of the previous year, of £79,267. Those from passenger traffic improved to the extent of £14,380, the increase being derived principally from second class suburban travel, and parcels traffic and miscellaneous collections yielded an increase of £5,524. Goods traffic accounted for a decrease of £85,572, due chiefly to losses of sheep caused by the dry seasonal conditions experienced last year that have not yet been made good, in consequence of which the quantity of wool railed was less. The effect of last year's drought upon the pastoral industry, and the fact that improved seasonal conditions made it unnecessary to move large numbers of starving stock to agistment country, resulted in a decline of £13,599 in the earnings from livestock traffic.

Cheap Rates for Single Packages of Fruit

In order that people, particularly in country centres, may be able to obtain adequate quantities of fresh fruit and vegetables at a minimum cost, and to assist growers in the disposal of their crops, special cheap rates are applicable to the conveyance of single cases of fresh fruit and vegetables by rail. Under a Grower to Consumer scheme, which has been in operation for the past twelve months, and which is being well patronised, persons living in country districts may place orders with stationmasters for half-bushel cases of fruit or vegetables in season. These are supplied by a growers' organisation at prices which are uniform throughout the State. The prices include railway freight by goods train, which has been fixed at the low rate of 1s. per half-bushel case, irrespective of the distance conveyed. Special cheap rates are also available for the conveyance of single cases of highly perishable fruit and vegetables by passenger train.

Interruption to Traffic by Floods

The dislocation of railway traffic by floods is of more or less regular occurrence during the summer rains in the early months of the year, particularly in the coastal districts of the far northern portion of the State, where rain by the foot is by no means uncommon. During the month of February the main North Coast Railway from Brisbane to Cairns, 1,043 miles, was blocked at the northern end for ten days. A few of the rainfall registrations, in the area affected by the blockage, for the period February 13 to 20 when rain was still falling, are given hereunder:—

	Inches
Babinda	46·30
Tully	43·32
Innisfail	41·33
Cardwell	39·95
Ingham	34·08
Ayr	26·04
Townsville	22·66

At Cardwell 14½ in. were registered in 24 hr.

Blockages on this, one of the most important lines in the State, occur at a number of points in the far north, and it is not practicable to provide an all-weather line. However, in order that the interruptions to traffic between the cities of Townsville (800 miles north of Brisbane) and Cairns may be less frequent, and to reduce periods of delay to a minimum, the department has undertaken the work of replacing three low level bridges over rivers by high level structures. One of these has been completed and work on the other two is well advanced.

SOUTH AFRICA

National Roads

The Government five-year plan of national road construction framed under the National Roads Act, 1935, has been published. It is confined to national roads and provides for the construction, reconstruction or maintenance of roads at the cost of the National Roads Fund.

Approximately 5,396 miles of roads are recommended for declaration as national roads, the provincial mileage being: Cape 3,011, Natal 583 miles, Transvaal 1,075 miles and the Orange Free State 727 miles. The total expenditure over the five years will be £11,157,094 of which £4,107,000 will have to be borrowed. The balance will be made up from tax on petrol with £500,000 provided on last year's budget.

The chief feature of the scheme will be a road about 1,100 miles in length which will divide the Union longitudinally from the boundary of Southern Rhodesia at Beit Bridge, to the town of George, which is the central point on the southern coast of the Union. From this main artery other routes will radiate to the principal centres including: Pretoria to the boundary of Portuguese East Africa; Johannesburg to Durban; Johannesburg to Cape Town (via Kimberley); Winburg to Maritzburg and Durban; Bloemfontein to Kimberley; Reddersburg to East London; Colesburg to Cape Town; and Middleburg to Port Elizabeth.

An important transverse route is also proposed from Van Rhyn's Dorp to Cape Town, thence via Caledon, Mossel Bay, George, Port Elizabeth, East London, Umtata and Durban, terminating at Eshowe; in all about 1,400 miles in length. The road from Cape Town to Van Rhyn's Dorp may ultimately be extended into the north-western area of the Cape Province, and that from Durban to Eshowe may later be extended into the north-eastern districts of Natal and the Eastern Transvaal.

New Luxury Coaches

The S.A.R. & H. administration has converted two observation cars into lounge-saloons at the Pretoria workshops. The new saloons are 63 ft. long and are divided by glass panelled arches into three sections each of which is in a different colour scheme, blue, gold and green. Instead of the usual central lighting, cornice lights in pale amber have been fitted. The saloons have four card tables, two ordinary tables and 32 arm chairs fitted with ash trays and glass holders. The saloons are being used on the Union Limited and the Union Express trains between Johannesburg and Cape Town.

Financial Position

The results of working for the nine months April to December show a surplus of £2,582,795 of revenue over expenditure after allowing for special appropriations of £600,000 to Betterment Fund, £365,250 to deficiency in Pensions and Superannuation Funds, £750,000 to Rates Equalisation Fund, and £300,000 to writing out of Capital Account discount and expenses on pre-Union Capital. Revenue from transportation services only for the period totalled £22,403,529, an increase of £2,289,015 on the previous year. Railway working expenditure increased from £13,636,994 to £14,575,914.

UNITED STATES

Passenger Fares Decision

The long-awaited passenger fares decision was handed down by the Interstate Commerce Commission on February 28. The proceeding was instituted by the commission to determine whether or not the "basic" rate of 1·8d. a mile which has been standard since 1920 is any longer justifiable. The inquiry was begun after the railways in the West and the South had as a temporary trial abandoned the standard rate, and had begun to attract a considerably increased traffic at 1d. or less a mile for coach travel, and somewhat higher fares in Pullman cars. The Eastern railways alone held out for the higher standard of 1·8d., and of these, the Pennsylvania, the New York Central and the New York, New Haven & Hartford, were the only lines which offered testimony defending the rate. The Baltimore & Ohio favoured a reduction and the other Eastern railways took no public position.

The Pennsylvania, the New York Central, and the New Haven—the "three systems" as they are called in the commission's report—are, how-

ever, the largest passenger carriers of all the American railways, and their passenger revenues in the East alone were, in 1934, more than three times those of all the railways in the South, and 1·4 times those of the Western railways: in fact, in that year they earned 42 per cent. of the passenger revenues of all the American railways. These systems contended that, as the bulk of their traffic was "high class commercial travel" moving between the large centres of population which did not object to a rate as high as 1·8d. a mile, it would not measurably increase if the rate were reduced.

The Eastern lines offer many journeys at lower than the standard fares (among them week-end return tickets at approximately 1½d., and day excursions on Sundays and holidays, some of which are as cheap as ¼d. a mile). But these rates are for the most part offered at times and to places not easily available to the bulk of the commercial community.

Reason for Abolition of 1920 Standard Rate

In 1932 the Eastern railways showed a deficit of £900,000 in their passenger services (after payment of direct costs as well as an allocation of costs which are joint with freight service, but without any allowance for interest); and in 1933 this deficit amounted to £2,300,000. Thus the charge of 1·8d. a mile does not cover the costs of the service. The commission has not proved that an injustice is being done the travelling public, but rather that the rates must be reduced because its own judgment as to the rates which will yield maximum railway revenues is better than that of the responsible officers of the railways concerned.

There is a strong likelihood that the decision will be challenged in the courts. But such action would not necessarily prevent the lower rates from coming into force, because the Baltimore & Ohio and several other Eastern railways favour them and have so far refrained from making reductions only out of deference to the wishes of the "three systems." Probably the dominant opinion of the railway world would gladly see the commission's right to issue such an order denied by the courts, though it would welcome the lower rates if brought about by direct action of the Eastern railways who favour them.

ARGENTINA

Exchange Agreement Ratified

The agreement between the Government and the railway companies [see our issue of February 28.—ED. *R.G.*] by virtue of which the latter are to be permitted to remit to London during the current year a sum equivalent to their remittances during 1935, at the rate of $15·75 to the pound sterling; while, on the other hand, the railways agree to grant a rebate on the maize freights, was formally ratified on February 21. The text of the agreement is as follows:—

Art. 1.—The railway companies agree to grant a rebate equivalent to the sum of $3,500,000 paper on the tariff for the transportation of maize during the year 1936, preferential benefits being accorded in the case of maize carried over long distances. The arrangements for the carrying out of said agreement to be definitely settled by March 31.

Art. 2.—The railways agree to maintain the present scale of tariffs in force during the whole of the current year; and immediately the necessary adjustments in the maize tariffs have been made, the Government will put into force the exchange benefits to be granted to the railways, the rate of which shall be $15·75 paper to the pound sterling.

Córdoba Central Railway Petrol Railcar

The Córdoba Central Railway recently carried out a successful trial run with a railcar, constructed in the company's workshops at Córdoba, to the designs of the Chief Mechanical Engineer, Mr. J. Mailer. The car is propelled by a Chrysler Imperial 112-h.p. motor, weighs 12 tons, is capable of a maximum speed of 65 km.p.h. and has accommodation for 46 passengers. Streamlined and pale green in colour, the coach has double seats on each side—instead of the usual single seats on one side and double on the other—and is provided with toilet and baggage compartments; it is lighted by electricity and controlled by air brakes.

Railway Lines for Buenos Aires New Port

The Ministry of Public Works has issued a Decree approving the scheme prepared by the Department of Navigation and Ports for the construction of a fifth grid of railway sidings in the New Port of Buenos Aires at an estimated cost of $1,804,341 paper, a sum already included in the original estimate of $14,905,000 for railway tracks at the New Port, approved in October last. This fifth grid will serve the quays of Dock "D" as well as the grain elevators to be constructed on Moles 4 and 5. The above sum provides for the corresponding loop sidings, signalling, electric light installations and surface drainage.

Railways and Public Telegrams

In deference to appeals from the commercial community and the public, the Government has agreed to modify the Decree—referred to in THE RAILWAY GAZETTE of September 27 last—prohibiting railways from accepting public telegrams at places where there are Government telegraph offices, by permitting their acceptance:—

(*a*) If they have to be despatched when the local P.O. is closed, and are evidently of an urgent nature.

(*b*) When the telegrams are presented by a passenger on a train which is not equipped with a postal van for dealing with telegrams.

(*c*) When they are presented by a passenger who arrives at the station at the start of a journey.

(*d*) When the Government telegraph service is interrupted; in which case the Postmaster-General shall inform the railway company serving the affected locality, indicating the station or stations where public telegrams may be accepted until further notice.

FRANCE

Slight Improvement in Traffic Receipts

Traffic receipts are beginning to show a slight improvement after a long period of constant decreases. Recent weekly returns make a more favourable comparison with last year's figures, some railway systems recording small gains. In the week ended February 25, the total receipts were fr. 175,204,000 against fr. 175,447,000 for the same week in 1935, the decrease being thus no more than 0·07 per cent.

Only two systems report declines, Alsace-Lorraine receipts being down by 13·91 per cent. and the P.O.-Midi by 0·49 per cent. On the other hand, the Etat receipts increased by 3·33 per cent., while the P.L.M., Est and Nord record respective gains of 1·58, 0·68 and 0·38 per cent.: weekly returns of wagons loaded are also showing constant increases.

Rail, Road, and Water Co-ordination

Transport co-ordination in France is making rather slow progress, despite the recent laws, which were intended to accelerate the movement. Road transporters are opposing what they regard as encroachments on their established rights, and their grievances have been aired in Parliament, notably in a long debate on February 27 in the Senate. The Minister of Public Works then announced that he had appointed another commission to examine all transport plans submitted to him by the co-ordination committee of rail and road transport. Details of the organisation of this commission were published in the *Journal Officiel* of February 28.

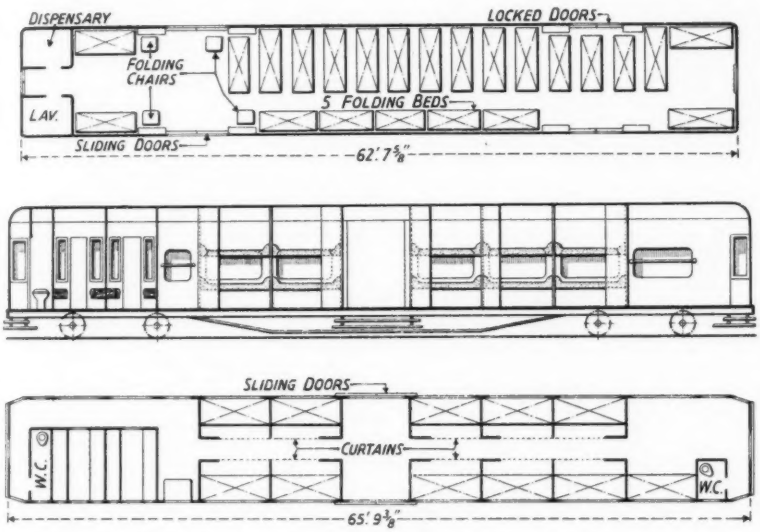
Oil Interests Protest

Opposition to the co-ordination plans is also coming from the navigation interests concerned in river and coastal traffic. Oil companies in particular are raising protests. They complain that restrictions will be laid on the carriage of oil and petrol by water. Transportation of oil and oil products on the rivers and canals of France has developed rapidly in late years owing to the development of heavy oil motors, which are used to propel large barges under favourable and economic conditions. Other protests, too, have been made against the reduction of rail freight charges for goods in bulk. The Havre Chamber of Commerce has protested that the new freight rates are calculated to prejudice the coastal traffic between the ports of Normandy

and Brittany, and the port of Havre. Similar objections have been made by the Association des Grands Ports français.

Ambulance Cars for Lourdes Pilgrims

In order to cater for invalid pilgrims journeying to Lourdes, five special ambulance cars have just been, or are being, completed, one for the Etat and four for the P.O.-Midi system. The Etat coach accommodates 23 cases all in beds at normal height above floor level. Five of the beds are folding and the rest fixed, and all are provided with rubber mattresses. Most of them are about 15 in. apart in one large open compartment, having no curtains or privacy. The beds vary in size from 5 ft. × 1 ft. 11¾ in. (for children) to 6 ft. 1 in. × 2 ft. 2¼ in. Sliding doors opening to a width of 4 ft. 10 in. are provided. (See first illustration below.)



(Above) Etat and (below) P.O.-Midi special ambulance cars for invalid Lourdes pilgrims

The four P.O.-Midi cars all accommodate 22 cases, the beds being arranged in two tiers, as shown in the second illustration. They are all 6 ft. 2¾ in. × 2 ft. 3½ in.: the headroom between the upper berths and roof is 3 ft. 3 in., and that between the upper and lower berths 2 ft. 9½ in. Each group of beds is screened off from the rest by cubicle partitions, and curtains on one side if desired. There are also eight seats arranged in two compartments, that can be converted into six-berth compartments with three tiers of berths, for the use of invalids who can sit up for part of the journey, but should lie down at night. There are two lavatories in each coach, which also has sliding doors opening to 5 ft. 1 in.

By special arrangements these P.O.-Midi coaches are to be reserved for all pilgrimages under the supervision of Thos. Cook & Son Ltd., and will be available during the coming summer for invalids travelling under the auspices of the National Pilgrimage (Society of Our Lady of Lourdes), and the Roman Catholic Archdiocese of Liverpool, and Dioceses of Leeds, Lancaster, and Southwark.

INDIA

Drastic Measures to Improve Finances

In July and October, 1935, ways and means of improving the financial position of the railways were discussed at meetings attended by the Railway and Finance Members of the Government, Agents of Railways and the Members of the Railway Board. In a recent interpellation, the Railway Member gave the Legislative Assembly the gist of what transpired at these meetings. The action already taken by the railway administrations, or proposed to be taken by them in the very near future, is expected to increase railway revenues by about Rs. 1 crore (£750,000). Apart from suggestions for alterations in rates and fares, attention was drawn at the meetings to certain other measures which it was considered were essential if the financial position of the railways was to improve. The most important of these were the following:—

(1) The problem of the ticketless passenger and the necessity for amendment of the Railway Act to provide for more stringent penalties on such travelling, which was estimated to cause considerable loss to the railways.

(2) The question of road motor competition and the necessity for persuading Provincial Governments (1) to regulate motor transport and restrict uneconomical competition between railways and road vehicles, (2) to use available funds for the construction of feeder roads in preference to competitive roads and (3) to refrain from action likely to prejudice the railways such as the imposition of a tax on travellers to places of pilgrimage going by rail and not by road.

(3) The reduction in 1935 of the surcharge on coal traffic and the rebate granted on the export of coal even to Indian ports. These were responsible for a considerable loss of revenue.

(4) The necessity for sustained efforts to check methods of defrauding railways, such as underweight of consignments, which, it was feared, caused large losses to railway revenues.

(5) The continuation of job analysis and of efforts to reduce expenditure in all directions.

RHODESIA

Record in Freedom from Accidents

The Rhodesia Railways are in the happy position of being able to report that not only were there no fatal accidents to passengers travelling on their lines during the year ended September 30, 1935, but also that, in spite of carrying 2,655,800 passengers in the four years prior to that date, there had been no fatal accident during that period. Only one passenger was slightly injured in the last financial year.

KENYA & UGANDA

Traffics in 1935

During the twelve months of 1935, the following tonnages were dealt with: those for 1934 are given for the sake of comparison:—

	1934	1935	Increase per cent.
Total exports to coast	267,599	356,482	33·21
Total imports from Kilindini harbour	79,984	92,703	15·90
Total traffic dealt with	716,285	833,518	16·37

The corresponding increase in train mileage amounted to 264,576 miles, or 13·69 per cent.

CHINA

Nanking-Wuhu Extension

The Nanking-Wuhu Railway which, as previously mentioned in these columns, is being extended southwards towards the Chekiang-Kiangsi line, has been completed as far as Sunchiapu, some 40 miles south-east of Wuhu. Construction upon a further 90-100 miles of line to Hweichow (due south of Wuhu) is also in hand: this section of line will apparently cross the Yangtze-Chientang watershed at an altitude of nearly 1,000 ft. It is likely to join the Chekiang-Kiangsi line not far from Yushan, and when eventually continued further southwards will go on to Yenping in Fukien, an extension now under survey.

When the connection outside Nanking between the Nanking-Shanghai and the Nanking-Wuhu (Kiangnan) lines is completed, about March 1, a through service of trains will be run between Wuhu and Shanghai.

BRITISH RAILWAY STATISTICS

"The Railway Gazette" monthly table for Dec., 1935, as compared with Dec., 1934, compiled from the Ministry of Transport Statement No. 193

Description	Great Britain*	G.W.R.	L.N.E.R.	L.M.S.R.	S.R.
PASSENGER TRAIN TRAFFIC—					
Number of pass. journeys (ex. season ticket holders)	104,132,250	7,538,987	14,777,739	23,302,837	17,769,892
Increase (+) or decrease (—)	+ 1,719,318	— 249,297	+ 219,661	— 369,352	— 18,948
Passenger receipts (excluding season ticket holders)	£4,192,499	£599,394	£838,370	£1,247,044	£904,664
Increase (+) or decrease (—)	+ £101,640	+ £12,320	+ £22,591	+ £24,738	+ £12,183
Season ticket receipts	£779,121	£43,505	£126,637	£183,291	£277,688
Increase (+) or decrease (—)	+ £23,660	— £28	+ £1,433	— £3,752	+ £19,620
Parcels and misc. traffic receipts (excluding parcels post)	£1,055,410	£194,775	£304,376	£409,766	£125,280
Increase (+) or decrease (—)	— £20,865	— £6,417	— £3,091	— £468	— £11,925
FREIGHT TRAIN TRAFFIC—					
Freight traffic (tons) (excluding free-hauled)	21,858,649	4,951,686	10,194,185	10,314,047	1,276,468
Increase (+) or decrease (—)	+ 908,474	+ 365,760	+ 327,100	+ 573,414	+ 96,248
Net ton-miles (excluding free-hauled)	1,239,699,805	222,244,890	422,415,953	510,774,837	50,539,211
Increase (+) or decrease (—)	+ 85,339,082	+ 23,553,815	+ 22,894,408	+ 33,751,984	+ 3,905,467
Average length of haul (miles) (excluding free-hauled)	56·71	44·88	41·44	49·52	39·59
Increase (+) or decrease (—)	+ 1·61	+ 1·55	+ 1·32	+ 0·55	+ 0·08
Freight traffic receipts	£6,806,658	£1,142,000	£2,206,847	£2,856,000	£339,068
Increase (+) or decrease (—)	+ £414,592	+ £131,600	+ £48,789	+ £178,000	+ £1,515
Receipts per ton-mile	1·318d.	1·23d.	1·25d.	1·34d.	1·61d.
Increase (+) or decrease (—)	— 0·011d.	+ 0·01d.	— 0·04d.	— 0·01d.	— 0·13d.
Freight train-loads: Average train-load (tons)	132·57	137·71	138·50	131·05	104·70
Increase (+) or decrease (—)	+ 5·45	+ 7·62	+ 3·95	+ 5·41	+ 7·33
Net ton-miles—					
Per train engine-hour	890·68	952·03	973·65	832·42	756·69
Increase (+) or decrease (—)	— 77·49	— 75·42	— 45·63	— 105·71	— 1·36
Per shunting-hour	841·68	788·83	942·86	845·87	545·66
Per total engine-hour	432·74	431·39	479·00	419·55	317·04
Net ton-miles per route-mile per working day	2,950	2,835	3,195	3,503	1,172
Increase (+) or decrease (—)	+ 189	+ 290	+ 160	+ 206	+ 96
Wagon-miles. Total	343,220,268	60,972,047	119,926,348	144,214,389	16,192,808
Increase (+) or decrease (—)	+ 14,949,283	+ 4,708,192	+ 5,012,836	+ 4,600,483	+ 708,862
Percentage of loaded to total	66·69	67·71	64·12	68·53	65·92
Wagons per train— Total	34·73	35·13	35·21	34·73	31·55
Increase (+) or decrease (—)	+ 0·72	+ 1·09	+ 0·69	+ 0·55	+ 1·07
Loaded	23·16	23·79	22·58	23·80	20·80
Empty	11·57	11·34	12·63	10·93	10·75
Train-miles. Coaching—Per train-hour	14·65	13·49	14·01	13·76	17·26
Per engine-hour	11·64	10·63	10·77	10·44	14·17
Train-miles. Freight—Per train-hour	7·90	8·44	8·24	7·35	8·98
Per engine-hour	3·26	3·15	3·49	3·20	2·99
Engine miles. Total	44,775,710	7,079,561	12,390,288	16,651,570	5,856,170
Increase (+) or decrease (—)	+ 1,273,824	+ 333,936	+ 301,783	+ 472,943	+ 163,524
Mileage run by engines. Total train-miles—					
Coaching	21,941,869	3,069,318	5,014,696	6,998,439	4,287,064
Freight	9,883,876	1,735,843	3,405,976	4,152,805	513,272
Engine-hours in traffic. Total	5,102,494	862,996	1,508,691	2,046,293	492,701
Increase (+) or decrease (—)	+ 377,858	+ 77,264	+ 79,321	+ 201,034	+ 19,048
Shunting miles per 100 train-miles—					
Coaching	7·80	7·22	6·81	8·55	8·75
Freight	78·70	87·31	72·36	76·73	100·92

Passenger Traffic Statistics: Number of journeys, receipts, and receipts per journey (excluding season ticket holders)—December, 1935

Subject	Great Britain	G.W.R.	L.N.E.R.	L.M.S.R.	S.R.	Cheshire Lines	Liverpool Overhead	L.P.T.B.†	Mersey
Full fares—									
Pass. journeys	35,338,006	747,242	1,226,478	1,599,563	3,038,352	20,041	165,377	27,564,173	96,430
Gross receipts	£895,938	£72,538	£113,718	£119,739	£189,363	£2,572	£1,707	£377,799	£1,671
Receipts per pass.	6·08d.	23·30d.	22·25d.	17·97d.	14·96d.	30·80d.	2·48d.	3·29d.	4·16d.
Reduced fares—									
Excursion and week-end—									
Pass. journeys	40,420,331	4,567,488	9,382,284	13,897,414	8,805,426	403,096	70,493	1,412,356	748,722
Gross receipts	£2,561,546	£427,851	£588,972	£910,345	£530,042	£23,069	£608	£30,340	£10,775
Receipts per pass. journey	15·21d.	22·48d.	15·07d.	15·72d.	14·45d.	13·74d.	2·07d.	5·16d.	3·45d.
Workmen—									
Pass. journeys	24,486,457	1,708,863	3,225,493	6,715,612	5,175,794	235,228	216,270	6,167,188	202,586
Gross receipts	£357,878	£25,360	£52,693	£107,043	£85,875	£4,002	£1,808	£69,042	£1,811
Receipts per pass. journey	3·51d.	3·56d.	3·92d.	3·83d.	3·98d.	4·08d.	2·01d.	2·69d.	2·15d.
Other—									
Pass. journeys	3,882,449	514,952	942,141	1,087,888	749,552	59,248	47,223	394,516	12,489
Gross receipts	£370,857	£73,120	£81,319	£106,655	£98,660	£3,269	£304	£3,145	£176
Receipts per pass. journey	22·93d.	34·08d.	20·72d.	23·53d.	31·59d.	13·24d.	1·55d.	1·91d.	3.·38d.
Total—									
Pass. journeys	104,132,250	7,538,987	14,777,739	23,302,837	17,769,892	717,659	499,363	35,538,233	1,060,227
Gross receipts	£4,192,499	£599,394	£838,370	£1,247,044	£904,664	£32,951	£4,427	£480,326	£14,433
Receipts per pass.	9·66d.	19·08d.	13·62d.	12·84d.	12·22d.	11·02d.	2·13d.	3·24d.	3·27d.

* All standard gauge railways. † Includes passengers originating on the railway undertakings, and on the Whitechapel and Bow Joint Railway.

ALUMINIUM IN ROLLING STOCK CONSTRUCTION

By ERNEST V. PANNELL, M.I.E.E., M.I.A.E.

A STUDY of recent developments indicates that railway engineers are paying more attention to the deadweight of rolling stock which has to be hauled by the locomotive. At the present time, in passenger train practice, the weight of coach and equipment per passenger varies from one third of a ton in the case of third class compartment stock, up to some three tons or more for a sleeping car, supposing every seat or berth to be occupied. Obviously, in electric suburban transit where trains operate with an average of as many as two stops a mile some cognisance has been taken of the problem, for in point of fact the train energy in such service is very nearly proportional to the weight to be hauled. In other words, if the weight of a tube train be halved, the energy input will be reduced in almost the same ratio. In long distance steam operation, however, little care has until recently been taken to reduce the deadweight per passenger, since it has been felt that the work done by the locomotive was exerted mainly against rolling friction and wind resistance. However, where conditions require slacks, grade climbing, and other adverse conditions the weight of the train will undoubtedly make itself felt, and will affect in a marked degree the ability to regain time lost by slacks.

Another factor is at least as significant as the energy or fuel consumption. According to Mr. G. H. Taylor in a statement made before the Institution of Locomotive Engineers, one half the cost of permanent way maintenance is directly proportional to the weight of the trains, while the cost of rolling stock maintenance is 60 per cent. proportional to its weight. It was indicated that with a 30-ton coach more than 3d. a year could be saved for every pound its weight was reduced, this saving relating to maintenance alone. A similar computation made by the engineers of the Boston Rapid Transit Railway in the U.S.A. shows a saving of 6d. a year including both maintenance and power costs. This saving, multiplied by many pounds and many coaches, will amount to a considerable total.

Any reduction in the weight of rolling stock must necessarily give no suggestion of flimsy construction. For this reason steel has gone far to replace timber, and the indications are that light aluminium alloys are technically capable of replacing steel. The design of modern passenger aircraft will substantiate this, for the total weight of a modern passenger aeroplane is some four times the weight of the passengers, while, as stated above, the ratio in the case of a passenger train is from five to fifteen times, in this case not including the motive power. In comparing the modern high strength aluminium alloys with other metals for structural uses, a fundamental fact must be kept in mind. Light alloys are approximately one-third the weight of steel, and a good deal more than one-third the strength, thus, other things being equal, some economy in weight is assured. But it will be seen that the loads and stresses themselves are almost entirely a function of the weight of the structure or vehicle; in other words, certain members have to be strong because they are so heavy. Aluminium alloy, therefore, presents a cumulative advantage, since as its weight is less, its loading is also less.

The first important use of aluminium for railway coaches was probably made by the Lancashire & Yorkshire Railway about the year 1910, when Mr. George Hughes, then Chief Mechanical Engineer, showed that the use of light metal panels for the electric coaches on the Liverpool-Southport line was responsible for a distinct saving not only of weight but of energy consumed. Such facts have perhaps been realised more fully by engineers responsible for electric railways, because the energy metered to the trains is subject to more careful and rapid analysis than the coal consumption of a steam train. The early electrified sections of the Southern Railway also adopted aluminium panels and fittings with a view to saving weight and energy consumption. The sheet metal used at that time had a tensile strength of some 10 tons per sq. in., whereas subsequent intensive development of light alloys during and after the war resulted in the production of sheets having 25 to 30 tons per sq. in. As a consequence of this it became possible to use such light metals not simply for panelling screwed to the wood structure of the car, but in the form of plates and structural members carrying stress.

Progress in Great Britain and Abroad

A considerable amount of light alloy rolling stock has been put into service in many parts of the world, and in frame and body construction, that is in the vehicle as a whole above the level of the bogies, the substitution of one ton of aluminium alloy has been found to replace something over two tons of steel. A notable case is that of the French State Railways, where on the Paris suburban lines more than 1,000 cars are now operating, each including 1½ tons of light alloy structural sections, panels, floors, roofs, and the like, thus saving more than 2 tons of deadweight per car. The technical advantage gained is, however, much more important than this, since the use of aluminium has enabled the axle weight to be kept just below the limit of twelve tons. A small percentage of additional weight would have necessitated six-wheeled bogies for this stock, some of which, incidentally, is double-decked. Similar conditions are found on the Long Island Railroad running into New York, where light alloy construction has just made double-deck coaches possible. The maximum practicable use of light alloy construction was exemplified in the Pullman cars built for the Chicago Exhibition, in which not only the entire bodies, interior equipment and frames were of light alloy, but also the bogies, brake gear and other mechanical members. Here again it was found practicable to reduce the number of axles from six to four, which in itself represents an important saving in first cost and maintenance. All this, of course, is effected while maintaining the full passenger capacity of the car.

At the present stage of development it can be said that the maximum use of light alloy for the car body is technically and economically justified. The use of similar alloys for the bogies and undergear is technically but probably not yet economically practicable. The high-speed trains recently put into operation on such systems as the Union Pacific and the New Haven in the U.S.A. bear this out, but as a result of the use of light alloys so extensively in the body structure, they are able to reduce the number of the standard steel bogies. A normal three-car main line train in American practice will have six 6-wheeled bogies, a total of 18 axles. The three-car light alloy trains above mentioned use only four 4-wheeled bogies with articulated construction, a total of sixteen axles. With first class accommodation or its equivalent,

and with compartments for mail and baggage, the deadweight per passenger is less than three quarters of a ton, and this includes the motorcar, replacing the locomotive.

One of the fundamental properties of light alloys which is largely responsible for the building of light, strong railway coaches of this type is the ease with which they are extruded. The car is built as a tube or hollow girder using plates which are riveted to longitudinal sections running the entire length of the vehicles. These sections for the most part are extruded through steel dies to the exact shape called for by the designer. No longer is it necessary to compromise by using the nearest possible standard section of angle or channel. The most complicated shapes are obtainable by the extrusion process, and they fit right into place when the car is assembled. It should be noted that the high strength of light alloys of aluminium is derived not from rolling or otherwise cold working, but from the heat treatment imposed. This fact is of the greatest importance in the most effective utilisation of the material, and it is peculiar to light alloys exclusively among structural metals.

So far progress in this country has not developed very far along the lines above outlined, but indications are that lightweight rolling stock is occupying the attention of many railway engineers. High strength aluminium alloys, such as duralumin and hiduminium, sheets and sections are produced in Great Britain and are available for commercial uses. Analogous alloys for casting, such as Wilmil and Alpax, are similarly available, and as a matter of fact have already been adopted in British railway practice in some instances for the casting of doors and fittings.

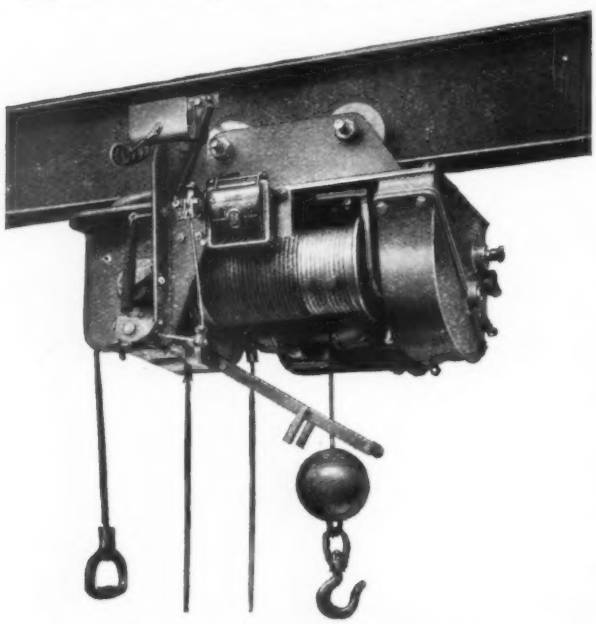
Lightweight Vehicles and Collisions

It is believed that one of the most important features of lightweight rolling stock is in connection with collision damage. Unfortunately the risk of collision cannot be ignored, and with the greatly increased speed of trains, density of traffic, and increased weight, the effects are becoming more severe. Clearly the energy involved in a collision will be reduced in the same ratio as the weight of the trains involved; the rate of retardation will also be in favour of the lightweight stock whether the wheels are locked by the brakes or not. One of the most promising ways to reduce the effect of collision is to reduce either weight or speed, and clearly the latter factor cannot be modified. The fundamental property of the material used, *i.e.*, its modulus of elasticity, has not been fully considered. The modulus for light alloys is ten million, that for steel is thirty million. In other words, there is an elastic yield three times as great in the case of aluminium. This in itself is an important factor of safety, especially where enormous amounts of energy must be absorbed in an incredibly small distance, as is the case in a collision. In any event, the safety feature of light alloy rolling stock construction deserves study just as much as the factor of economy.

A New Electric Hoist

A STANDARD range of Witton-Kramer monorail electric hoists, of compact construction and low operating cost, for lifting loads from 3 cwt. at 60 ft. per min. to 10 cwt. at 20 ft. per min., has recently been introduced by the General Electric Co. Ltd., of Magnet House, Kingsway, London, W.C.2. Larger hoists of a similar design for loads up to 5 tons can also be supplied as required.

The base of the standard hoist is a substantial steel plate on which are mounted the bearings and electrical equipment. The rope drum, which is made of the best grade cast iron, is driven through a train of machine-cut spur wheels and pinions, which are totally enclosed in a cast iron casing. Gun-metal sleeve bearings are supplied and arranged for grease lubrication. The magnetic brake is of the standard Witton-Kramer single-phase type for a.c. supplies or of the self-contained type with totally enclosed solenoid for d.c., and is arranged to act on the coupling between the motor and the gearing. Moreover, in addition to holding the load if the supply fails, the brake comes into operation automatically when the controller is moved to the "off" position, and also if the bottom block strikes the lever operating the limit switch. A 1½ h.p. motor of the normal G.E.C. design is fitted to the standard models. For d.c. circuits the motors are series wound, while for a.c. circuits they are of the squirrel cage type (two or three phase) or of the repulsion induction type (single phase).



Witton-Kramer monorail electric hoist

The hoist is suspended from a four-wheel trolley running on the bottom flange of an 8-in. by 4-in. rolled steel joist trackway. A radius of not less than 8 ft. can be negotiated. The current collectors are of the slipper type, and the controller is mounted on the hoist and operated either by pendant cords from the floor level or by remote control.

L.M.S.R. Motorship to be Assembled Alongside Lake Windermere.—A new L.M.S.R. motorship, intended for passenger services on Lake Windermere, is to be assembled by its banks after being conveyed in sections from Barrow-in-Furness by railway. The new vessel, for which a contract was recently placed by the L.M.S.R. with Vickers-Armstrongs Limited of Barrow, will be about 135 ft. long, with a breadth of 25 ft., and will be designed to provide the maximum amount of deck space for passengers. Her twin screws will be driven by two sets of diesel engines, giving a service speed of about 11 knots. The erection at Lake Side, Windermere, is expected to begin towards the end of May as the vessel is to be used for this summer's services.

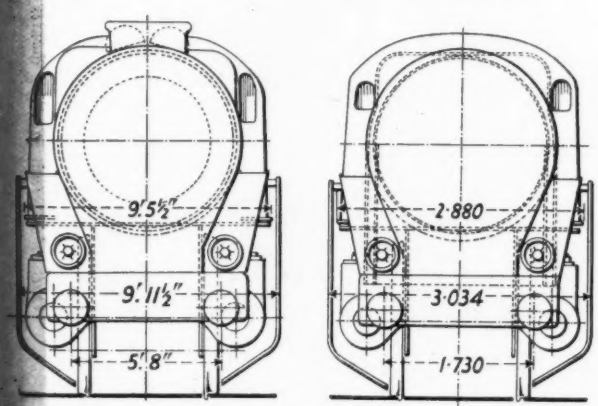
NEW EXPRESS PASSENGER BEYER-GARRATT LOCOMOTIVES FOR ALGERIA

As a result of the successful performance of a 4-6-2 + 2-6-4 standard gauge express Beyer-Garratt locomotive on the Algerian Railways, an order was placed for a series of twelve similar engines, the design of which embodies a number of improvements

IN July, 1932, the Société Franco-Belge de Matériel de Chemins de Fer, of Raismes (Nord), France, delivered to the Paris, Lyons and Mediterranean Railway for service on its Algerian system, an express passenger Beyer-Garratt locomotive having a double Pacific wheel arrangement, namely, 4-6-2 + 2-6-4. This locomotive, which was designed in close collaboration with Beyer, Peacock & Co. Ltd. of Manchester, was described in THE RAILWAY GAZETTE for August 5, 1932. Prior to being shipped to Algeria it was submitted to extensive tests on the P.L.M. Railway in France for several months, and subsequently for a period of some eighteen months in Algeria. These tests were referred to in considerable detail in the issue of THE RAILWAY GAZETTE dated September 29, 1935.

This engine incorporated the largest coupled wheels yet included in any Beyer-Garratt engine, and it is interesting here to record what was specified by the railway company at the time the engine was ordered. It was required that it should be capable of running with proper stability on straight track at a speed of 110 km.p.h. (68·4 m.p.h.) during trials, and 105 km.p.h. (65·2 m.p.h.) in service. Thus for the first time speeds exceeding 60 m.p.h. were demanded from an articulated locomotive in regular service. During its first trials, the excellent free running characteristics of this type of engine immediately became apparent, and remarkable stability at high speeds was also exhibited. A top speed of 81 m.p.h., constituting a world's record for an articulated engine, was reached, which, the Algerian authorities stated, could have been considerably exceeded but for the speed regulations in force.

More than one-third of the Algiers-Oran line, a distance of 420 km. (262 miles) is very hilly, with curves and reverse curves of 300 m. (984 ft.) radius. Taking into account curvature, the gradients are as severe as 22 mm.



Smokebox and end views

per metre or 1 in 45½. However, the first locomotive was immediately authorised to run at 120 km.p.h. (74·6 m.p.h.) in ordinary service, the maximum speed allowed for steam haulage on the French railways.

These performances and the general test results thus presented the possibility of a solution to the operating problem confronting the P.L.M. (Algerian) Railway. The company had originally proposed to use Garratt locomotives to haul its heavy expresses over the mountainous section (Atlas Mountains) which had hitherto required double and triple heading, but the proved capacity and stability of the Beyer-Garratt locomotive at speed demonstrated its suitability also for the fast haulage of trains over the comparatively level parts of the system. Thus were combined haulage power and speed enabling an engine of this type to traverse the whole distance between Algiers and Oran.

Alterations in Valve Gear

While the performance of the locomotive on the tortuous and mountainous sections of the line left little to be desired, it was considered that the steam distribution at early cut-offs of the Walschaert valve gear was unsatisfactory, having a checking influence at high speed. Accordingly some experiments were conducted by M. Ducluzeau, the Chief Mechanical Engineer of the Algerian Railways, and certain important modifications were introduced, which were briefly referred to in THE RAILWAY GAZETTE for July 5, 1935. The chief of these was the

replacement of Walschaert valve gear by the Cossart system of cam-operated piston valves, which made possible operation at very much earlier cut-offs, in fact cut-offs less than 7 per cent. were used for more than one-third of the journey, with improved economy. The performance on the through run from Algiers to Oran was further improved by the freedom given by the liberal by-pass system in this valve arrangement.

In the meantime, the amalgamation of the P.L.M. Algerian system and the Algerian State Railways was effected, and the unified Algerian Railways (Chemins de fer Algériens) had to face the problem of hauling heavy expresses on the yet more difficult line between Algiers and Constantine, a distance of 464 km. (288 miles), with gradients of 26 mm. per metre (1 in 38½) and curves of 300 metres (984 ft.) radius. A part of the line traverses the Atlas plateau at more than 1,000 metres (3,280 ft.) above sea level.

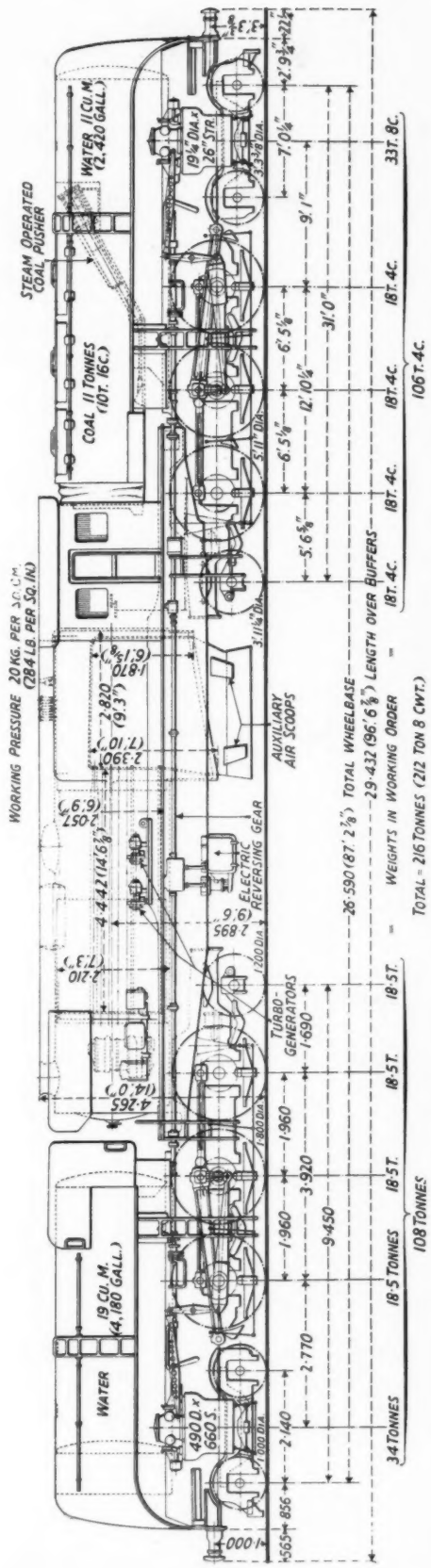
The trials on the Algiers—Constantine line confirmed the good results already obtained on the Algiers-Oran section, with the result that an order was placed for twelve Beyer-Garratt locomotives with the Société Franco-Belge, which firm has a working arrangement with Beyer, Peacock & Co. Ltd. By the courtesy of these two firms, we are enabled to describe these unique engines and have had the opportunity of inspecting and riding on the first of the new series in France.

The new engines, built to the requirements of M. Ducluzeau, while having the same main characteristics as the original engine, differ considerably in detail and embody important changes. From the various illustrations and line diagram a very good idea of this remarkable machine can be obtained.

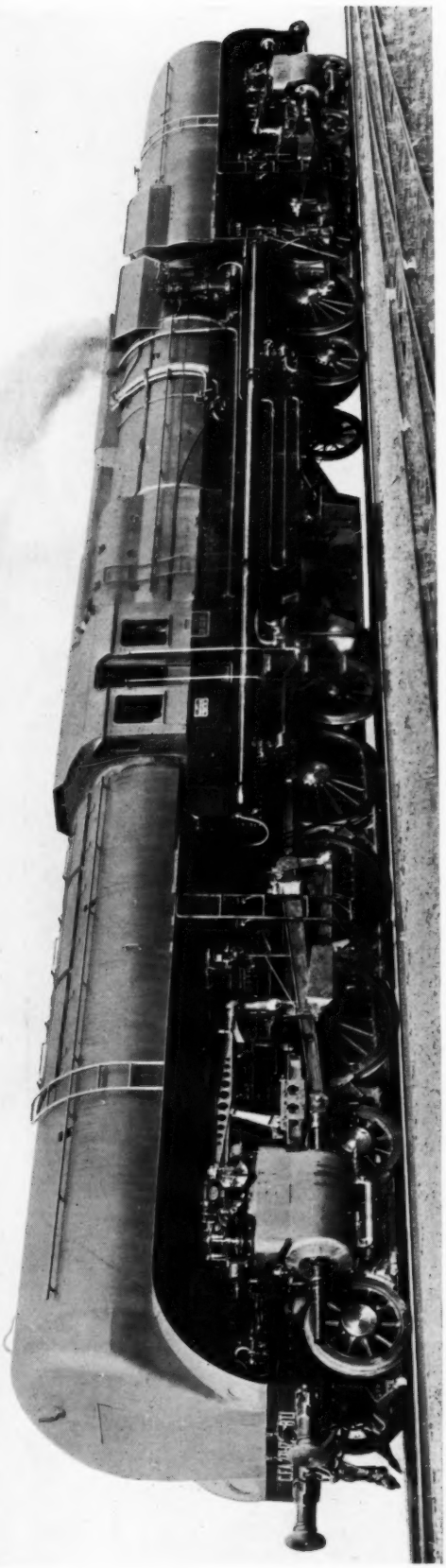
The new specification, based on the trials in Algeria, stipulates the loads required to be hauled on certain grades, and the speed, also that the engine must be able to run at 120 km.p.h. (75·6 m.p.h.) on the level and at 50 km.p.h (31·1 m.p.h.) on curves of 200 metres (656 ft.) radius with good stability. The most fundamental alteration distinguishing the present engine from the original form of its prototype is the Cossart valve gear and system of vertical piston valve distribution which the tests in Algeria, it is claimed, have proved to be superior to the Walschaert gear for cut-offs below 20 per cent., and equivalent to it for cut-offs between 20 per cent. and 30 per cent.; beyond 30 per cent. the less expensive Walschaert gear is rather more economical. The Cossart valve gear as fitted has been manufactured in Paris by Corpet Louvet et Cie. A notable innovation is the method adopted for varying the cut-off. This is effected electrically by a system developed by the Société Franco-Belge, in which an additional turbo-generator provides current to a series motor operating a shaft from the boiler cradle, where the apparatus is fixed, to the valve gears on each unit, the articulation being taken care of by telescopic universal couplings. By means of a small lever, which is clearly shown in the illustration of the cab, the smallest alteration in the cut-off can be accurately and quickly effected. This apparatus is duplicated in the opposite corner of the cab for use when the engine is driven bunker first. Although the alteration to the cut-off can be effected with very low steam pressure, provision is made for the working of the turbo-generator in series or by compressed air from a special reservoir for use if necessary in the running shed.

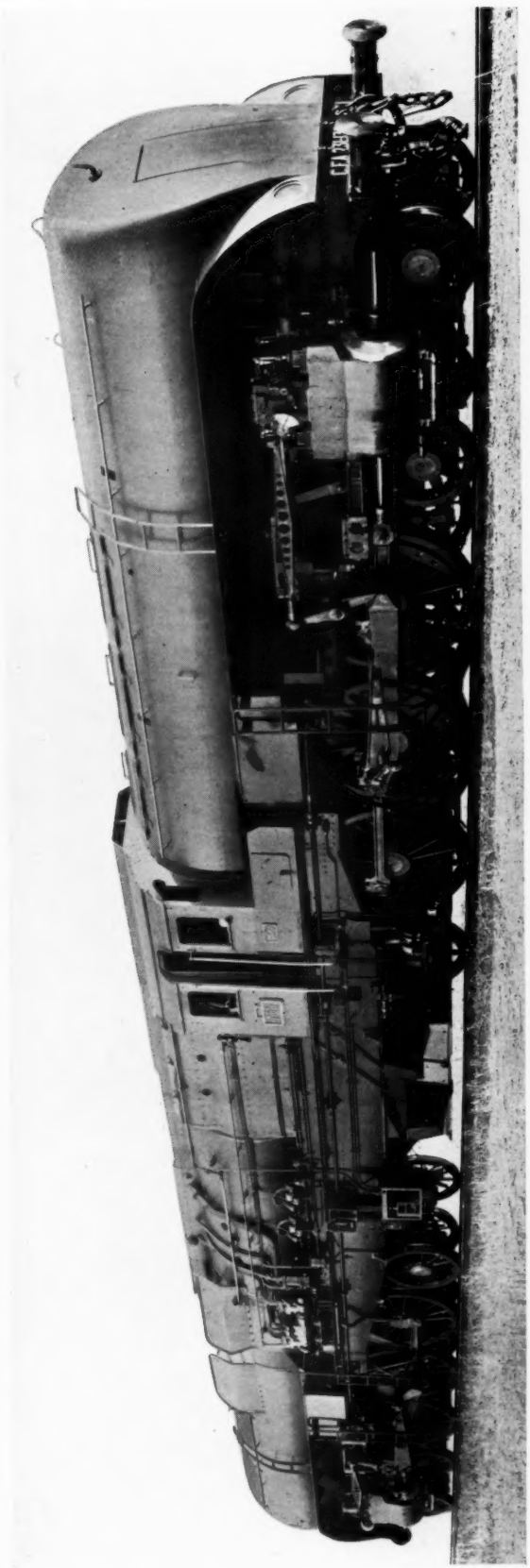
Improved Boiler Characteristics

The next most important boiler alteration is the increase of the working pressure from 16 kg. per sq. cm. (227·5 lb. per sq. in.) to 20 kg. per sq. cm. (284 lb. per sq. in.).

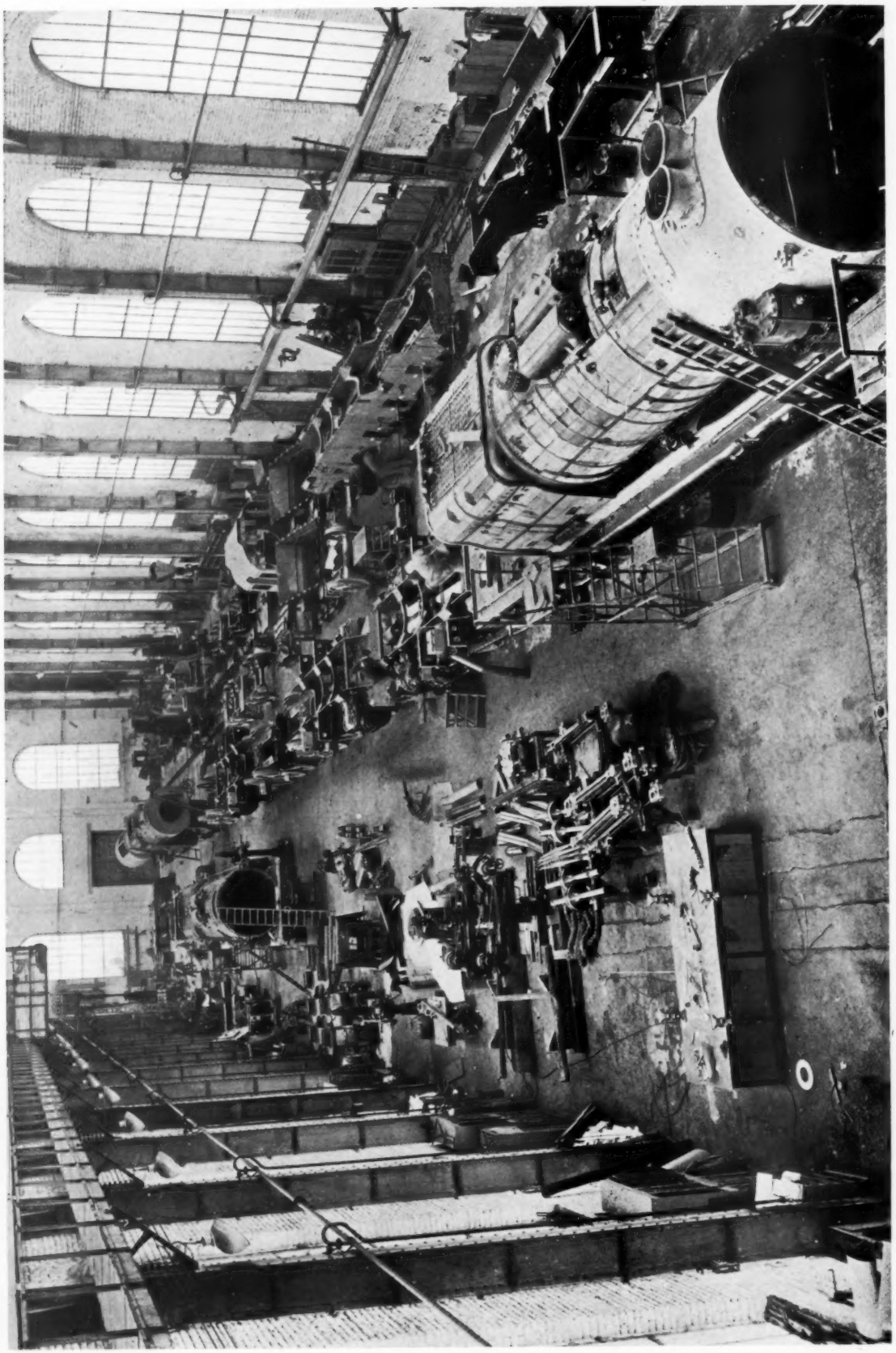

WORKING PRESSURE 20 KG. PER SQ. CM. (284 LB. PER SQ. IN.)
STEAM OPERATED COAL PUSHER
WATER 11 CU. M. (2,420 GALL.)
COAL 11 TONNES (10T. 16C.)
AUXILIARY AIR SCOOPS
ELECTRIC REVERSING GEAR
TURBO-GENERATORS
WATER 19 CU. M. (4,180 GALL.)
TOTAL WHEELBASE = 29·432 (96'6⅝") LENGTH OVER BUFFERS = 26·590 (87'2⅜") WEIGHTS IN WORKING ORDER
TOTAL = 216 TONNES (212 TON 8 CWT.)
34 TONNES
18·5 TONNES
108 TONNES
106T. 4C.

Outline diagram showing details and general dimensions of 4-6-2 + 2-6-4 express passenger Beyer-Garratt locomotive for the Algerian Railways





Right hand and (below) left hand side views of 4-6-2 + 2-6-4 express passenger Beyer-Garratt locomotive, Algerian Railways



Erecting shop at the works of the Société Franco-Belge de Matériel de Chemin de Fer at Raismes, (Nord), France, showing Beyer-Garratt locomotives under construction for the Algerian Railways

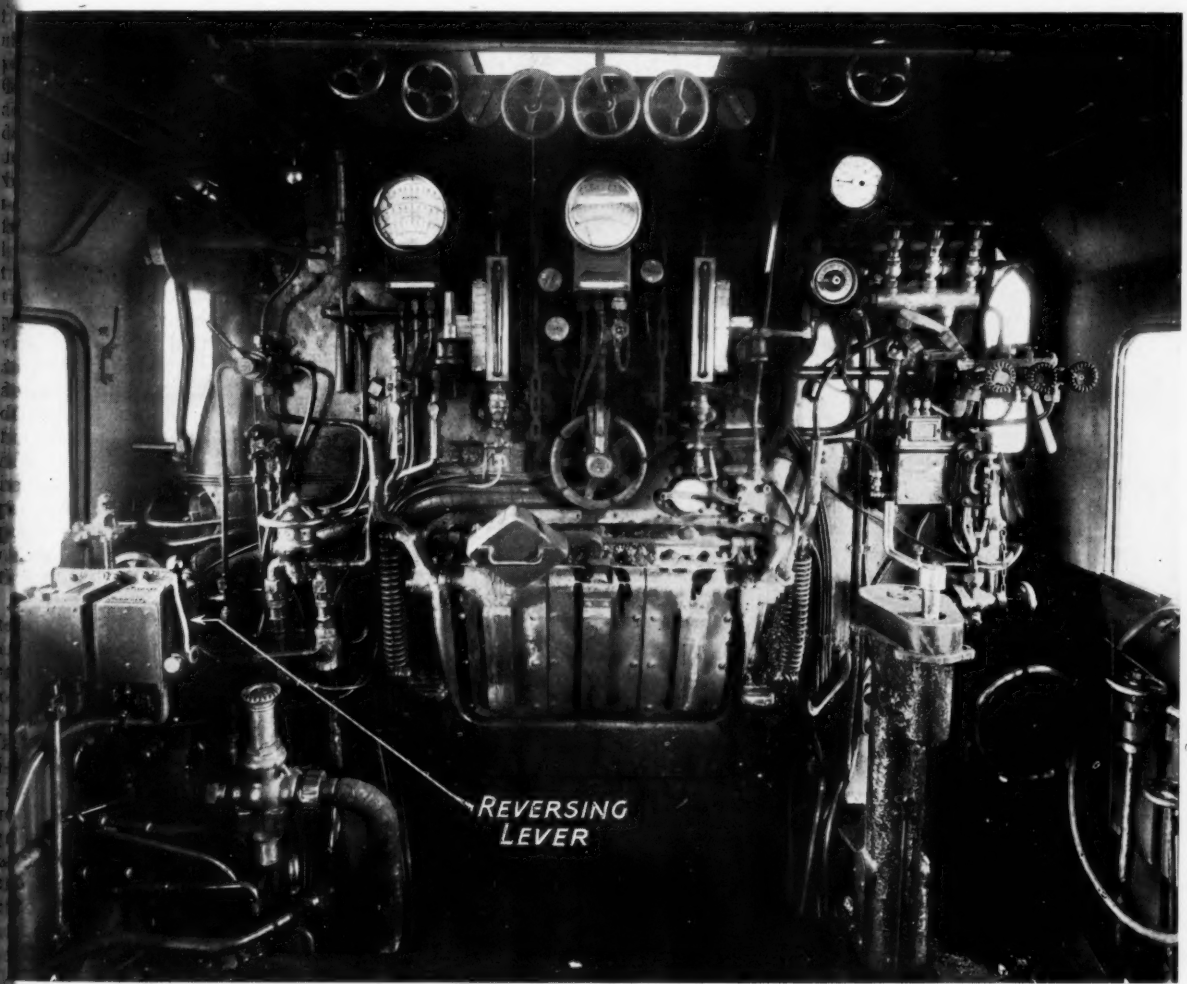
A double blastpipe is also provided, arranged transversely in the smokebox, and a double chimney, similar in many respects to the P.L.M. standard arrangement. Adjustable tops of special design are also provided, the position of which can be varied at will from the cab. An A.C.F.I. feed water heater with delivery regulator is another important piece of equipment.

Apart from the considerable increase in boiler pressure, certain small changes have been made in the arrangement of the heating surface. The number of elements, for instance, has been decreased from 50 to 48 and the small tubes from 232 to 225, but a small increase in heating surface is nevertheless obtained by resorting to flue tubes of larger diameter, *i.e.*, 138 mm. (5·43 in.) and 51 mm. (2 in.) respectively. The separate chamber type of superheater has also been adopted, the apparatus being of the Superheater Company's pattern including a multiple valve regulator with five valves. The area of the grate, which is fixed and has bars in three sections, has also been enlarged and the inclination of the grate increased by some 8 deg., while two special scoops with doors controlled from the footplate—one for each direction of travel—ensure an additional supply of air. The firebox crown stays have hemispherical heads in view of the possible later application of oil firing. Thus the boiler is in keeping with the latest French ideas; and with the higher pressure, higher superheat, still lower back pressure (it was practically 1 lb. per sq. in. in the original engine), and the more economical use of the steam and freer by-passing, considerable improvement in economy and performance is expected. Incidentally it may be recorded that, after three years' service, not a single tube or stay in the boiler of the original locomotive has been replaced, the modifications above mentioned having been made solely with a view to improving as much as possible the boiler efficiency. The boiler plates, which are of 2·5 to 3·0 per cent. nickel-steel, have treble riveted lap joints.

New Features and Dimensions

The diameter of the coupled wheels and the size of cylinders and their stroke remain as in the prototype engine. The tractive effort of the new locomotive thus works out as 26,410 kg. or 58,102 lb. at 75 per cent. boiler pressure. The maximum axleload has been increased to 18·5 metric tons.

The general lines of the locomotive are most imposing, a semi-streamlined effect being obtained by a clever development of cylindrical tanks and bunker having the same overall diameter as the boiler. The view from the cab is thus improved, while wind shields fitted on each side of the chimney, and also on the adjacent water tank to keep smoke clear of the cab, together with the neatly



Interior of cab, showing controls and fittings (Note small reversing gear lever)

lagged fittings on the top of the boiler, complete the general streamline effect.

The following are the principal dimensions:—

Cylinders (4), diameter ..	490 mm.	19¼ in.
,, stroke	660 ,,	26 ,,
Coupled wheels, diam. ..	1,800 ,,	5 ft. 11 in.
Boiler pressure	20 kg. per sq. cm.	284 lb. per sq. in.
Heating surface—		
Tubes (inside)	239·19 sq. m.	2,574 sq. ft.
Firebox	20·47 ,,	220 ,,
Total	259·66 ,,	2,794 ,,
Superheater (outside) ..	90·60 ,,	975 ,,
Total	350·26 ,,	3,769 ,,
Grate area	5·40 sq. m.	58 sq. ft.
Tractive effort at 75 per cent. B.P.	26,410 kg.	58,102 lb.
Maximum axleload	18·5 tonnes	18 tons 4 cwt.
Total weight in working order	216 ,,	212 tons 12 cwt.
Water capacity	30 cu. m.	6,600 gallons
Coal ,, ...	11 tonnes	10 tons 16 cwt.
Ratios:	231-132 AT-I (Prototype)	231-132 BT-1 to 12 (New Series)
Superheater surface / Heating surface (tubes and flues)	34·88 per cent.	34·89 per cent.
Section of gas passage / Grate area	14·03 ,,	14·07 ,,
Heating surface (tubes and flues) / Grate area	50·94 ,,	48·08 ,,
Total heating surface / Grate area	68·71 ,,	64·86 ,,

The tanks are of riveted and welded steel, and folding doors give access to the bunker for filling. A Franco-Belge steam driven coal pusher is provided to reduce the fireman's work.

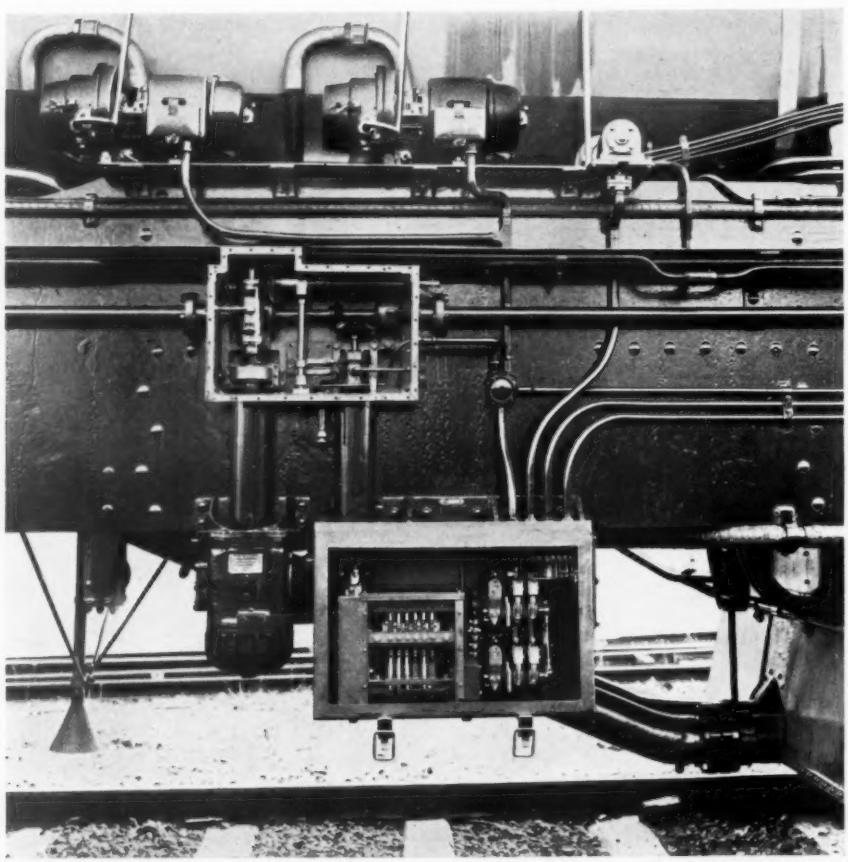
The cylinders and details of the whole of the Cossart valve gear motion are of robust construction, and every detail has been most carefully considered with a view to long life in service. The balancing of the driving rod of the Cossart gear and its relationship to the general balancing of the engine have been based on the latest research, and it is claimed that highly satisfactory running with the lowest possible dynamic augment has been achieved. The cylinders, of cast steel, are fitted with liners of vanadium-titanium cast iron. The pistons, in the former engine of cast steel, with three rings, are now of forged steel with four rings of vanadium-titanium cast iron, each alternate ring being slotted, and all kept in position by stops. Tail rods are fitted and the cylinders are provided with steam-operated drain cocks combined with relief valves set at the boiler pressure. The slide bars, now composed of a massive single bar, and the crossheads have been specially designed in accordance with the latest Garratt practice for back gear working, and ample lubrication is arranged for from the mechanical lubricator. The top shoes of the crosshead are of an aluminium alloy and the lower ones of bronze.

Further Equipment Details

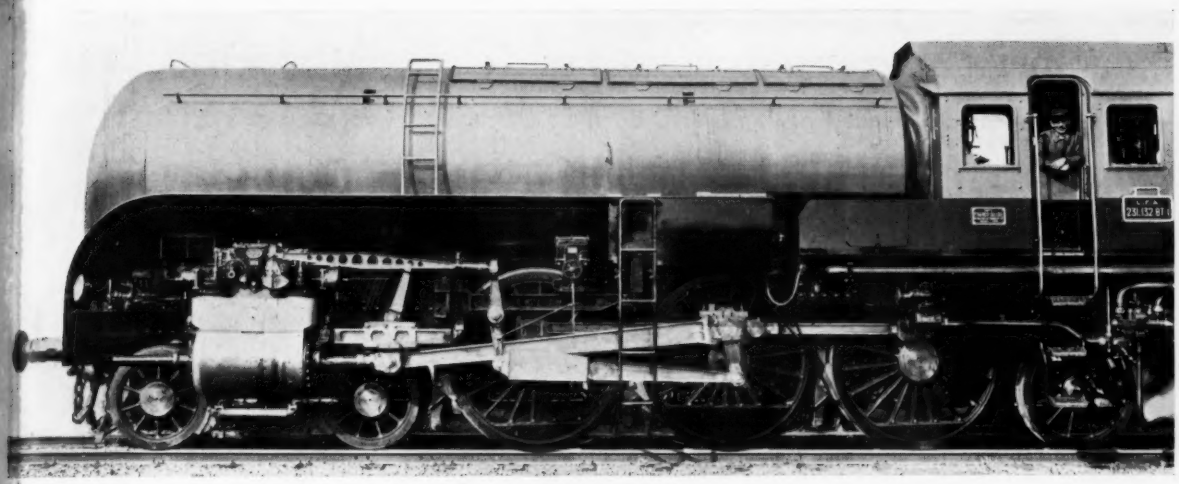
As already mentioned, the engines are equipped with A.C.F.I. feed water heaters; a Bourdon injector is also provided, and each, having a capacity of 75 gallons of water a minute, is capable of feeding the boiler by itself. A simple but effective means of dealing with the 8 drain cocks of the A.C.F.I. pump is arranged by a rod passing through extensions of these cocks connected to a small piston operated by compressed air.

The lubrication of the locomotive has been most carefully considered, and the more important parts are taken care of by two mechanical lubricators of the F.S.C. Bourdon type with compartments, each lubricator having 28 feeds. These provide forced lubrication to the cylinder admission pipes and certain other parts of the Cossart cam boxes, to the piston rods and tail rods, the high pressure ball and socket joints, the axleboxes of all axles, the side rollers and pivots of the articulation, and the crosshead. It might here be mentioned that the pivots are of the Beyer Peacock patent adjustable type, completely enclosed. The side bearers are composed of rollers as introduced by Beyer Peacock on various recent designs.

The locomotive is fitted with Westinghouse automatic brake of the moderable type acting on all coupled wheels and the four-wheeled bogies, the arrangement of the latter being the latest French standard with one cylinder. The portion of adhesive weight now braked has been raised from 54 per cent. to 66 per



Turbo-generators and electrical apparatus for operating the reversing gear



Hind unit, showing details of Cossart valve gear

cent. A screw brake operated by hand wheel from the cab acts on the coupled wheels of the trailing unit.

The cab and footplate of this most interesting locomotive, as we can say from personal inspection, have been most carefully considered, the various fittings being well placed and ready to hand. As is possible in the Garratt engine, the cab is exceptionally large, a most acceptable point owing to the oppressive climate of Algeria during several months of the year. To reduce the heat as much as possible large skylights designed specially to ventilate are arranged, while for use in tunnels when necessary a turbo-fan has been fitted by which cool air from the ground can be pumped into the cab. As these locomotives are turned only to equalise flange wear, the essential driving controls are duplicated. Thus on the right-hand side of the cab (not visible in the photograph) are a duplicate regulator, reversing gear and whistle, control for the sanding gear in reverse running and duplicate controls of the compressed air brake, both automatic and moderable. These duplicate controls render the manipulation of this large engine very easy. The firehole door, it will be noted, is in three sections, the inner part serving as a draught shutter. Its movement is linked with that of the blower, so that opening is prevented unless the blower is on; this is an important point when it is considered that this engine runs distances of over 250 miles chimney trailing, thus any tendency for the flame to lick out of the box is obviated.

Electric light on the engine is provided by a second turbo-generator (the other turbo-generator being used entirely for reversing), and lights are arranged at important points including one over the speed indicator. The usual headlights, it will be noted, have been replaced by two lights built in immediately above the buffer beam. These were manufactured by Ducellier, of Paris, and one is of high power.

Two triple pressure gauges are provided, the one recording the moderable, automatic and main reservoir pressures of the brake system, and the other the boiler, admission and steam heating pressures. The gauge on the right is a pyrometer, and it may here be mentioned that with the rearrangement of the heating surface it is expected that the highest superheat recorded on the original engine, namely 716° F. will be considerably exceeded. The speed indicator and recorder is of the Flaman type graduated up to 140 km.p.h. (87 m.p.h.), and carries a device for recording the pressure of the steam heating system with which the locomotive is equipped. An alarm bell of the P.L.M. type is also fitted, and is operated by a metal cable from the guard's van. In addition to other customary fittings may be mentioned the provision of drench pipes to the smokebox and ashpan, a special mud extraction arrangement by which any scale separated from the water is conducted by channels and extracted by rack valve with remote control, a Delmar soot blower, and Ross pop safety valves. The pneumatically operated sanding gear has received particular attention and is of course arranged for both backward and forward running.

The new locomotives incorporate many improvements in detail which, as previously intimated, have been developed in close collaboration with Beyer Peacock & Co. Ltd., and reference to which space will not permit, but even without these and the important modifications introduced by the Algerian Railways and the builders, the original locomotive of this class is officially reported to have behaved perfectly since its delivery in July, 1932, boiler repairs being practically nil, while no hot bearings or steam pipe troubles have been experienced. The general maintenance has also been found lower than the equivalent engine power in ordinary form displaced.

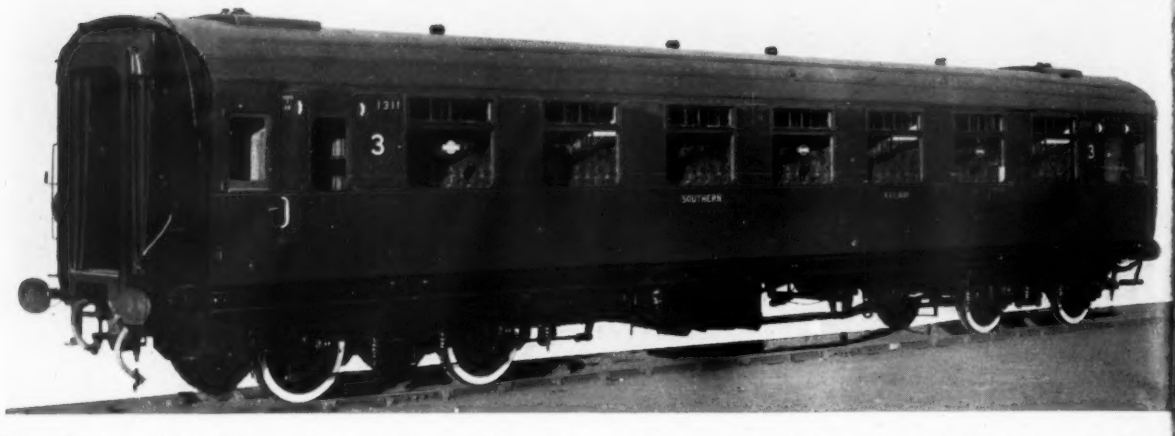
From the foregoing description it is apparent that the performance of the original locomotive has been the subject of close study. That this should result in an order for twelve similar locomotives for more extended working than that originally contemplated, namely the whole main line from Oran to Constantine, a distance of 550 miles, seems to confirm the utility of the Garratt locomotive for service beyond the capacity of the orthodox type.

As we go to press we are informed that the first locomotive of the new series has already attained on its first trial trip, with a small regulator opening, 75 m.p.h. at 4 per cent. cut-off, and, as indicating its free running and low internal resistance, over 60 m.p.h. (light engine) has been maintained for a distance of 5 km. on practically level track with steam shut off. In June or July it is understood that one of these engines will be loaned to the Chemin de fer du Nord for tests on heavy trains. We would, in conclusion, say that every credit is due to the Algerian Railways and the two firms responsible for the detailed design and construction of the new locomotives.

(*See also editorial article on page* 606 *and group photograph on page* 628)

NEW OPEN TYPE THIRD CLASS CARRIAGES, SOUTHERN RAILWAY

These vehicles are employed on the London-Bournemouth service



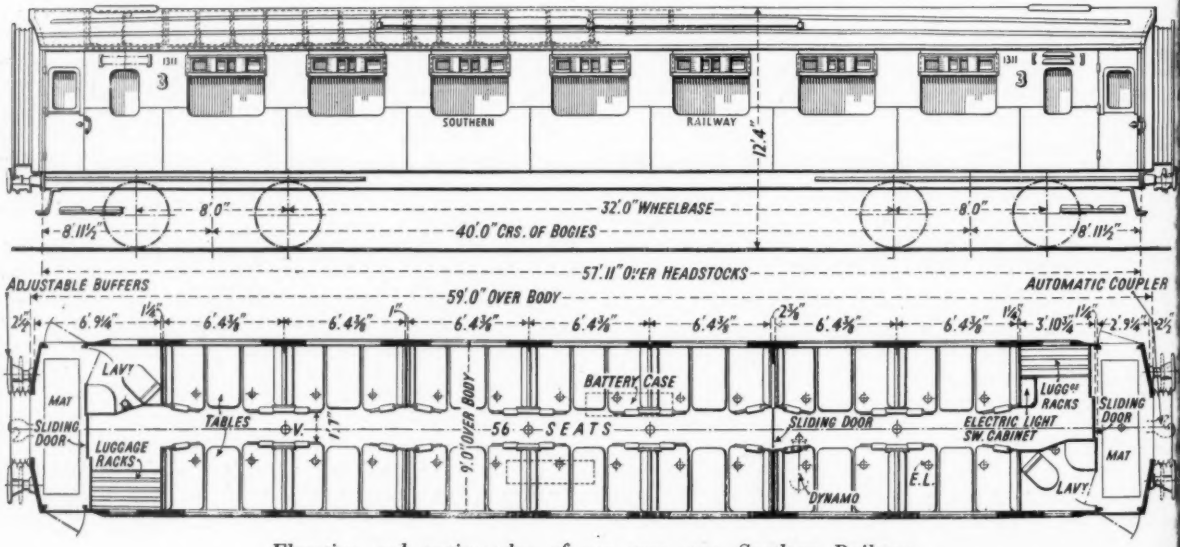
THIRTY new third-class saloon coaches of the open, or centre gangway type have recently been introduced in the steam service of the Southern Railway. The vehicles have been built in the company's workshops at Eastleigh and Lancing to the designs of Mr. R. E. L. Maunsell, Chief Mechanical Engineer, and are now in general use on the system.

As our illustrations show, the vehicles have doors at each end, and provide seating accommodation for fifty-six passengers. The saloons have smoking and non-smoking compartments with a communicating door, and ample luggage accommodation is provided in racks above the seats and at the sections of the coach adjacent to the vestibules. The construction of the body accords with the Southern Railway standard practice, having framing of hardwood timber, with galvanised steel panelling for the exterior, and floors of galvanised steel plates overlaid with Decolite. Mahogany is used for the interior decoration, and where panels are fitted these are figured, defined by white celluloid stringing and flush with the banding. A pleasing contrast to the woodwork has been obtained b using blue scratchproof Rexine in the vestibules an surrounds of the luggage sections of the coaches, whils silver-grey Rexine has been used effectively for facin the walls of the lavatory compartments. The ceilin throughout are 3-ply birchwood and painted with whit enamel. The floors of the saloons are covered with inlai granite linoleum with brick red rubber gangway runne edged in blue.

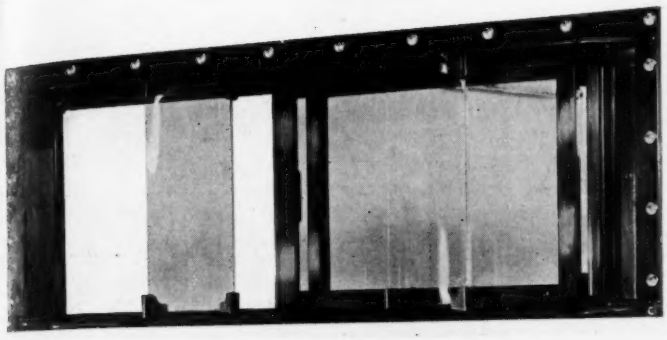
To add to the cleanliness of the compartments, loos coir mats level with the compartment flooring, are fitte in the vestibules. The seats are of the well type, fitte with conical spiral springs and overlaid with cushion containing Vi-Spring inserts. Headrests are provided fo each passenger, and at the seat ends the arm rests are Dunlopillo sponge rubber.

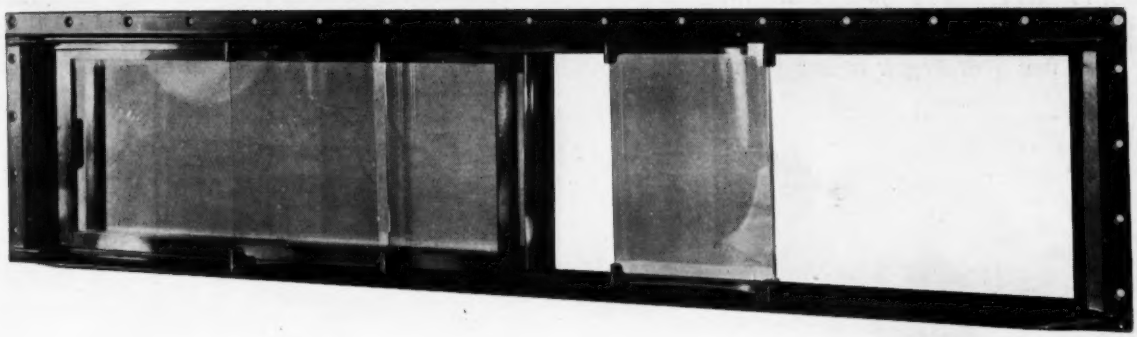
An Effective New Ventilator

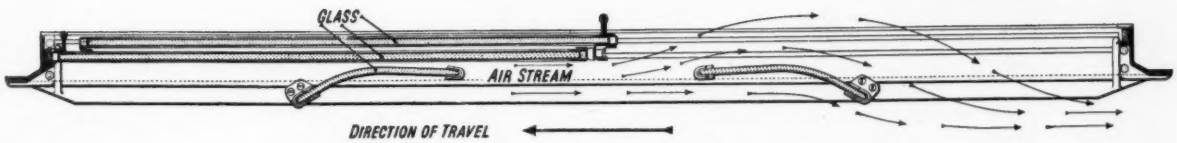
The windows are each divided into two portions, th lower and larger light being fixed and bearing agains



Elevation and seating plan of new open cars, Southern Railway



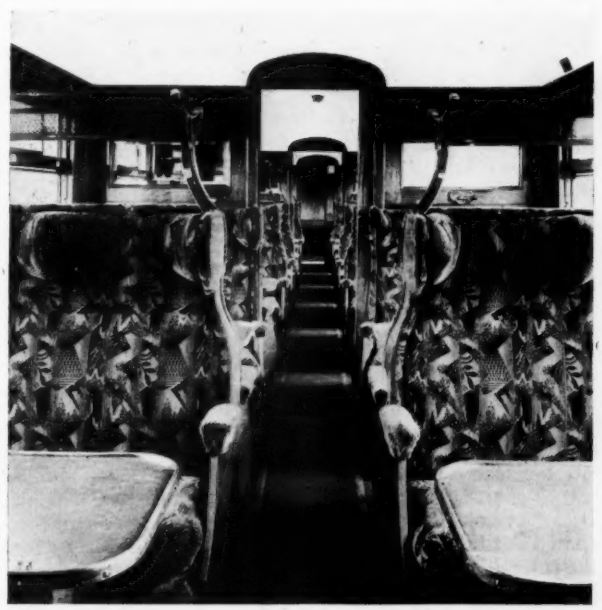




Details of the M.M. ventilators used on new Southern Railway carriages. That on the left is for placing on an ordinary carriage door above the drop light; below is shown the size used on wide windows, and below that a diagram illustrative of the action of this type of ventilator

the outside panelling, whilst to increase the passengers' comfort the upper portion is fitted with M.M. Air-Stream ventilators, which have two sliding windows. These ventilators are manufactured and supplied by Mead, McLean & Co. Ltd. and are arranged as shown in the accompanying illustrations. There are two movable frames above each large fixed window, and the device consists simply of a concave glass deflector close to the fixed panel. A stream of fresh air is guided along the inside face of the deflector by the forward motion of the car, and the major portion of the stream escapes through the rear opening by reason of the flaring of the deflector at this point. A certain amount of the air introduced from outside remains in the carriage and displaces the vitiated air, which latter passes through the rear opening. Through the combined action of the fresh air stream and the escaping used air, outside currents cannot penetrate past the rear edge. It will thus be seen that the air in the vehicle is subject to continuous changes, and the rate of change can be regulated by moving the rear of the two movable frames in the direction of the train movement. The action is entirely automatic and efficient, and a noteworthy feature is that draughts are obviated.

The bodies of the new coaches are equipped with Pullman type gangways and are mounted on steel underframes built up of rolled steel sections, which carry Laycock buckeye draw and automatic coupling gear, and adjustable side buffers. The bogies are the British type, constructed of rolled steel sections to the company's standard pattern. The coaches are vacuum fitted and steam heated, the heating being under the passenger's control, and they are also equipped with a 24-volt single battery system of electric lighting. The exteriors of the bodies are painted in the Southern Railway standard green, with black shaded yellow lining, and gold letters and numbers. The roofs are painted white, and the underframes and bogies black.



Interior of open third class carriage, Southern Railway

A HEAVY SPRING COILING MACHINE

For the rapid coiling, in the hot state, of bars intended for coiled springs for railway service

THE manufacture of coiled springs of the "heavy" type, as used in large quantities by the railways for suspension and drawgear purposes, was at one time dealt with by very elementary machines similar in general construction to the ordinary lathe; in fact, occasionally these coiled spring machines were old lathes adapted to a new purpose. Ordinary helical springs, which is the type mostly in use, are equivalent to a turned screw-thread, so that the lead-screw operating the lathe saddle for turning the thread could equally well operate a similar saddle for guiding a hot bar along a mandril fixed in the lathe, thus providing a regular pitch of the coils.

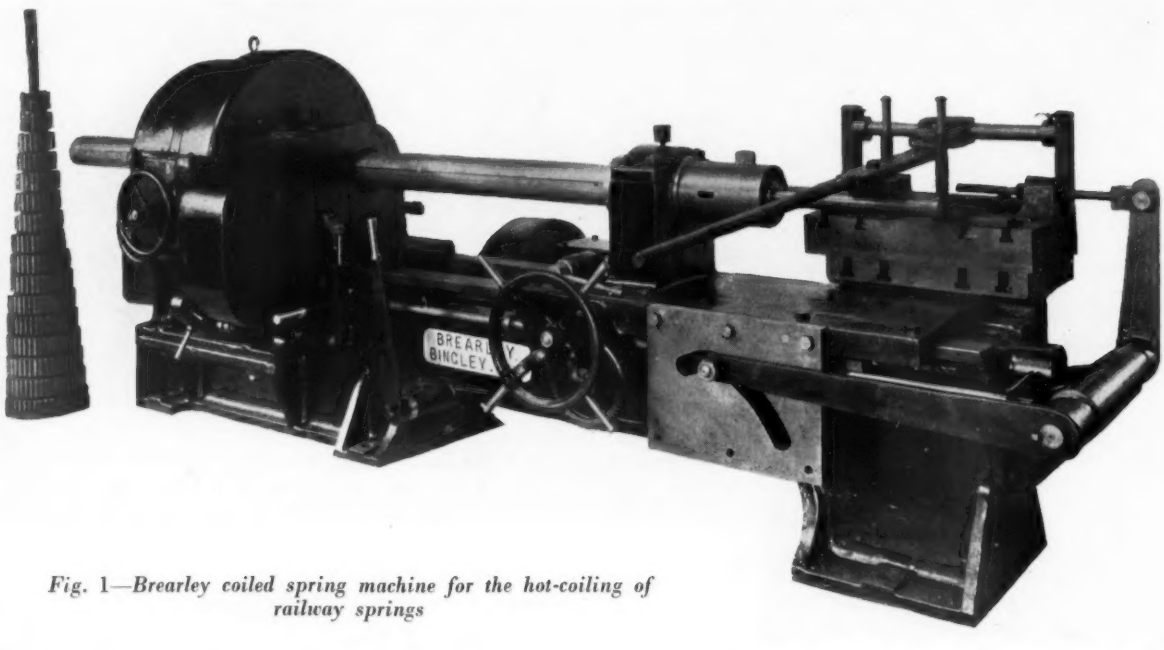


Fig. 1—Brearley coiled spring machine for the hot-coiling of railway springs

Coiled springs made from these simple machines had the ends finished by "smithing" in order to square them and provide a flat bearing, whilst springs of the volute pattern were either wound on a cast mandril with its steps of the correct pitch, or sometimes wound on themselves like a clock-spring, and then the middles were forced out to the necessary height.

As the years have progressed, however, the art of spring coiling has improved, not, perhaps, so much in the technique of the finished article, as in the speed with which the springs are produced, coupled with the facts that the ends can now be finished completely on the machine, whilst volute springs have the correct pitch given to the coils by means of a former. We illustrate in Fig. 1 the latest machine made in this country for the coiled spring trade. This is of the design and manufacture of Fairbank Brearley, of Bingley (Yorkshire), a firm which has specialised in the production of all types of machinery for the laminated and coiled spring trades for the past seventy years. The capacity of the machine shown is up to springs 2 in. square or 10 in. × $\frac{5}{8}$ in., in steel sections.

On the left of the machine is the substantial geared head, arranged for motor or belt drive, and this, through a friction clutch, operates the mandril which is supported at the outer end of the coiling spindle, with a bearing on the saddle. The saddle is traversed by a lead-screw concealed in the bed (which is provided with ball-thrust washers), and a substantial nut-box, which can be readily engaged or thrown out of gear by means of the horizontal lever adjacent to the head, this lever being connected with a rod on which are adjustable stops, so that the nut-box can be automatically operated by the travel of the saddle. The saddle can be traversed to any desired position by means of the attached handwheel. The nut-box lever is so arranged that it cannot be put into gear until the mandril has moved round a certain distance with the hot bar, in order that the first end may thus be finished "flat" so as to require no additional work after the spring has been coiled.

The end of the coiling spindle is bored out for the reception of the mandrils, which have to be inserted according to the diameter of the spring required. It is necessary always to have some spare mandrils when a high rate of coiling is being maintained, owing to the heat generated in them by the spring bar, so that no chance arises of a mandril becoming sufficiently heated to bend; a situation that can easily happen, particularly with small diameter mandrils making close-coiled tension springs, such as those used on the trolley-booms and the pantagraphs of electric rolling stock.

The carriage on the right carries the necessary guide rollers and pressure lever for the hot stock bar from the furnace. The operation, for an ordinary helical spring, is to start the spring coil at the outside end of the mandril, and, whilst the hot bar remains in its original position, the saddle moves outwards from the driving head at a

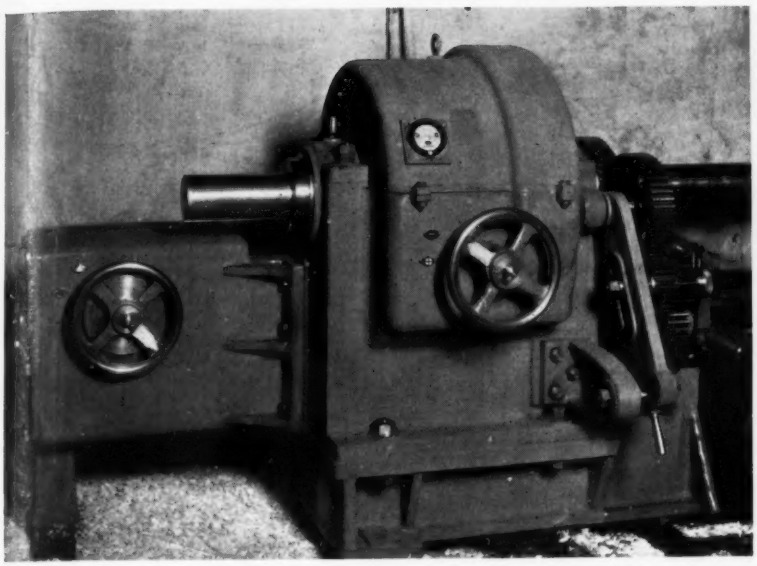


Fig. 2 (left)—Geared head

Fig. 3 (above)—Murray colour control dial attached to geared head

speed arranged in relationship to the revolutions per minute of the spindle, to give the necessary pitch to the spring. A set of change wheels, all machine-cut from steel blanks, is provided, as shown in the illustration, and this will allow for all pitches from ½ in. to 3 in., advancing in eighths of an inch.

When volute springs are being coiled, the former plate with its curved groove, shown in the front of the saddle, is put into operation. Owing to the varying diameters of each coil of a volute spring, it is essential for the pitch to be variable for each coil in order to provide a spring which is subject to reasonably uniform stress throughout. Strictly speaking, the pitch should alter directly as the square of the diameter, and an approximation to this is obtained by the use of the former shown. The long lever is coupled up to the guide carriage through which the hot bar is guided, and the correcting movement is obtained by permitting the guide carriage to travel in the same direction as the main saddle, but at varying speeds. For instance, the gear is arranged so that when the lever is in the bottom of the curved groove, the coiling is started. The travel of the carriage is then at its maximum and the pitch of the coils at the minimum. As the coiling continues, the movement of the carriage becomes less, so that the pitch of the coils becomes greater.

This coiling machine has fitted to the geared head a Murray colour control dial, for setting to the required speeds. These speeds, six in all, namely, 25, 34, 42, 45, 57, 75 r.p.m., are controlled by the two handwheels shown in the close-up of the geared head, Fig. 2.

On the left handwheel is a painted arm which can be set to the three symbols shown, namely, a yellow triangle, a green circle, and a red square. The setting in the illustration is on the latter. The wheel on the right has the distinctive symbols of a cross and a line respectively on a black ground, the setting in the illustration being to the line. The dial, shown in Fig. 3, is rotated until the required speed for the particular spring appears in the bottom window, and coincident with this, the necessary symbols to obtain this speed appear in the two upper windows, the wheels being then placed accordingly.

An essential accessory machine to this coiler is the taper roller, shown in Fig. 4, which is also made by Fairbank Brearley. To provide the nearest approach to reasonably perfect end coils on both ordinary helical springs and volutes, the uniform section bars as supplied by the rolling mills have to be "drawn" in thickness, and in the case of volutes, the flat bars have also to be tapered in width. The latter operation has to be carried out on relatively long-bladed shears, and an idea of the general

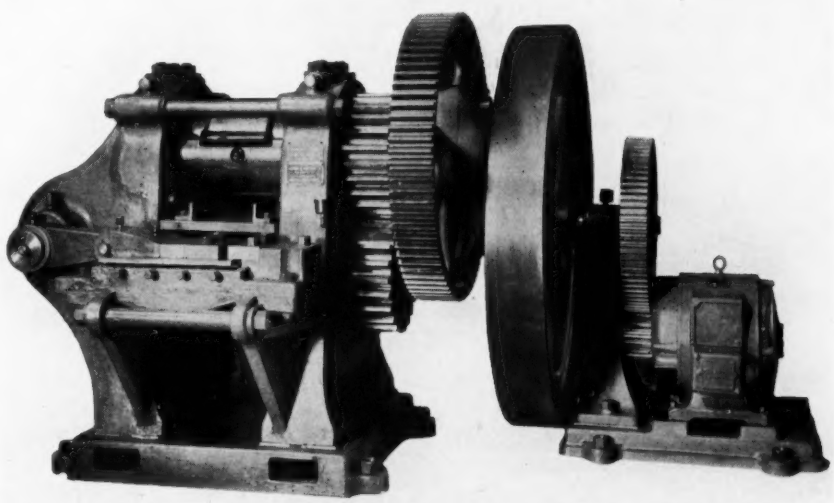


Fig. 4—Machine for rolling taper ends on bars for coiling into springs

dimensions is given in Fig. 5, which shows the standard wagon draw-spring of the Deutsche Reichsbahn. The principle of the taper rolling machine is the use of some form of eccentric roll, and at one time, either one or both of the rolls were really eccentric, and in consequence could only provide one type of taper. Later practice, however, arranges for an eccentric insert, which can be changed as required either for wear and tear, or taper dimensions. In this particular machine the inserts are of chilled cast iron, fitted into high-tensile forged steel rolls, and any desired taper is produced by means of screws and wedges. The lower roll is adjustable vertically to suit varying thicknesses, and a back stop limits the length of the taper according to the spring design. A squeezing slide is operated by the horizontal arm in the front of the machine, this narrowing the bar edgewise after it has been splayed by the tapering operation. When a long taper has to be drawn, as with volute springs, the bar has to be passed through perhaps three or four times, in each case to the stepped adjustable stops at the far side of the machine. The capacity of the present example is up to $1\frac{5}{8}$-in. rounds or squares, for ordinary helical springs, and up to 8-in. × $\frac{5}{8}$-in. flats for volute springs; the length of taper available is up to 18 in.

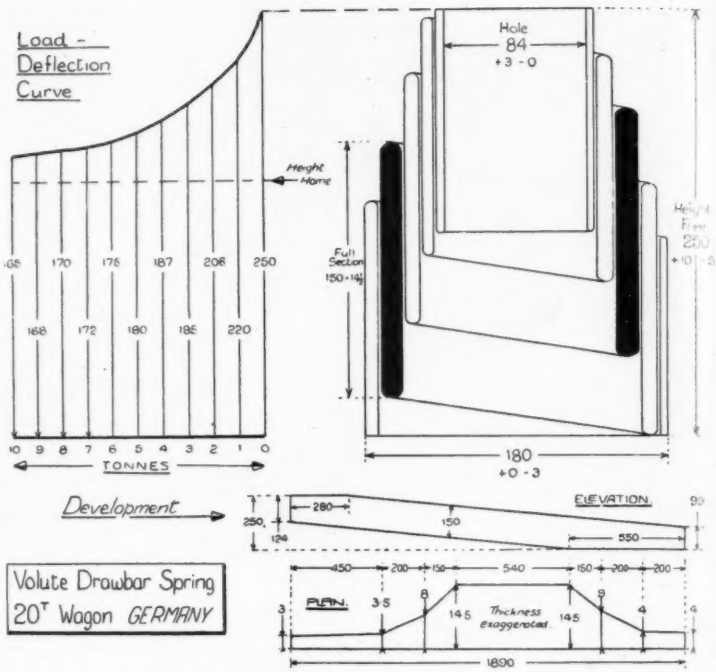


Fig. 5—Volute spring-plate development section, and load deflection curve

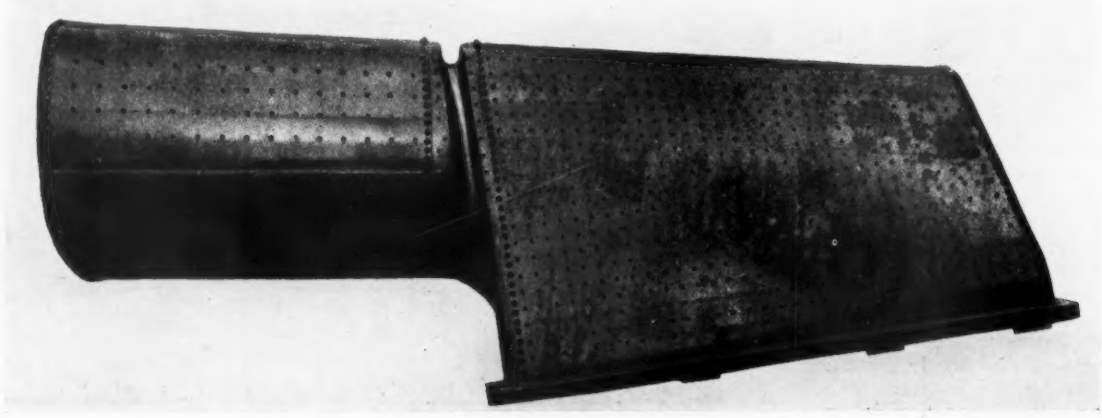
This type of coiling machine has proved itself very effective in workshop service, and several have been supplied by various railway shops of the Empire, owing to the present tendency of the administrations of the various railways to become self-contained as far as possible. The foremost requisites of a machine of this pattern are simplicity and substantial construction, two factors in evidence in the illustrations we reproduce.

Firebox and Combustion Chamber Design for Pennsylvania Locomotives

THE accompanying illustration shows the type of inside firebox and combustion chamber fitted to the Class M1 locomotives of the Pennsylvania Railroad. These engines have the 4-8-2 wheel arrangement and, it is claimed, what are probably the most carefully designed Belpaire boilers yet built. Among their characteristic features are the long combustion chamber and large furnace volume, together with a grate of moderate size and tubes of relatively short length.

There is considerable expansion in these long fireboxes when they heat up, and to provide for this the plate joining the crown of the firebox and combustion chamber is made with a corrugation as shown in the illustration. This corrugation, which acts as an expansion joint, is about 4 in. wide by 5 in. deep. To assist in the same purpose a crescent-shaped corrugation is formed in the front tube plate below the tubes. This corrugation provides sufficient elasticity to avoid serious internal stresses as the boiler heats up.

Our illustration is reproduced from *The Mutual Magazine*, the official publication of the Mutual Beneficial Association of Pennsylvania Railroad employees.



RAILWAY NEWS SECTION

PERSONAL

We learn that it is intended that the new post of Director of Transport in Nigeria, referred to in the estimates recently presented to the Legislative Council, shall be occupied by Mr. G. V. O. Bulkeley, C.B.E., at present General Manager of the Nigerian Government Railway, who is now on leave in England; but the appointment will not be officially announced until the estimates have been approved by the Secretary of State for the Colonies.

From the *London Gazette* of March 20: The Lord Lieutenant of the County of Kent has signed a commission for Major J. J. Astor, M.P., to be Deputy Lieutenant (March 16). Major Astor is a Director of the Great Western Railway.

Also, Territorial Army: Royal Engineers; Engineer and Railway Staff Corps.—Mr. A. R. Cooper, M.Inst.C.E., to be Lieutenant Colonel; and Mr. R. Gardiner, to be Major (March 21). Mr. Cooper is Chief Engineer, London Passenger Transport Board, and Mr. Gardiner is Superintendent, Southern Scottish Area, L.N.E.R.

Our correspondent in India learns that Mr. J. C. Highet, Agent of the North Western Railway, India, is to officiate as Member of the Railway Board in place of Mr. Tylden Pattensen, who is to be granted home leave.

The occasion of the transfer of Mr. P. Nunn from Divisional Superintendent, Western Division, Exeter, Southern Railway, to the London East Division was marked by a farewell gathering at Exeter, when about 160 members of the divisional staff presented him with a radio-gramophone and an album containing the names of some 700 subscribers, on Saturday last.

We regret to note the death, on March 20, of Sir James Alexander Cooper, at the age of 67. He was a Director of, among other concerns, Vickers-Armstrongs Limited, and during the war was, in 1917-19, Principal in charge of Raw Materials Finance at the War Office, and was decorated with the C.B.E. in 1918. From 1919-21 he was Director of Raw Materials Finance at the Ministry of Munitions, and was created a K.B.E. in the latter year.

Mr. John Wilson, O.B.E., M.I.E.E., M.Inst.T., who, as announced in our issue of March 13, has been appointed General Manager of the Entre Rios & Argentine North Eastern Railways, received a technical training at the Glasgow and West of Scotland—now Royal—Technical College, Glasgow,

Mr. J. Wilson, O.B.E.,

Appointed General Manager, Entre Rios and Argentine North Eastern Railways

and then had four years' mechanical and electrical practical training in this country. Subsequent to 1902 he gained further electrical experience in power station and cable work in various parts of Scotland, afterwards becoming Resident Engineer for the North Metropolitan Electrical Power Supply Company in 1907. In 1910 he joined the staff of Brown Boveri & Company, London, and was engaged in supervising the erection of plant, and as the firm's Representative Engineer in the North-East Coast area. In 1914 Mr. Wilson was appointed Electrical Engineer, B.A. Western Railway, being placed in charge of all construction work on his arrival in Buenos Aires. Volunteering for war service, he obtained a captaincy in the Royal Engineers (I.W. & D.) in 1917, and was employed at the War Office. In 1918 he was transferred to the Royal Marine Submarine Miners and subsequently to the Admiralty Anti-Submarine Research station. He was awarded the O.B.E. for his services, and was demobilised in 1919, when he returned to his former post in Argentina. In 1927 the electrical section of the C.M.E.'s Department was constituted as an independent department with Mr. Wilson as Chief Electrical Engineer. He was appointed Traffic Manager in 1930, and when, in 1933, the B.A.G.S.R. and B.A.W.R. were reorganised with a unified system of traffic operation, he was selected as Traffic Manager of the two systems jointly. Mr. Wilson is a Member of the Institution of Electrical Engineers and of the Institute of Transport.

Indian Railway Staff Changes

Mr. B. C. L. Bean, O.B.E., has been confirmed as Divisional Superintendent, N.W.R.

Mr. A. O. Evans, officiating Divisional Superintendent, E.I.R., has been granted eight months' leave, as from March 13.

Mr. G. J. Edes, Deputy Chief Engineer, Signals, N.W.R., has been granted seven months' leave, as from March 11.

Mr. G. D. Laurie, Acting Chief Auditor, B. & N.W. and R. & K. Railways, has been confirmed as Chief Auditor, as from October 1 last, *vice* Mr. E. M. Slane, retired.

Mr. C. W. Wroth, for the past 12 years Chief Engineer of the North Western Road Car Co. Ltd., with headquarters at Stockport, has been appointed General Manager of Stockport Corporation Transport in succession to Mr. A. T. Eardley who retires at the end of April.

We regret to record the death at Stafford, on March 7, of Mr. William Rowell, late Rolling Stock Superintendent of the former London & North Western Railway, a position he held for upwards of 20 years, prior to his retirement from that railway in 1911. He was 89 years of age.

Bronze memorial plaques honouring the memory of the late Sir Henry W. Thornton, K.B.E., are to be placed at

eleven selected places spread out across the Dominion of Canada. Each plaque will have at the top a full face likeness of Sir Henry, and underneath it will be the following inscription:—

In loving Memory
of
Sir Henry W. Thornton
K.B.E.
Chairman and President
Canadian National Railways Lines
1922-1932
Died, March 14th, 1933.
This Tablet is erected by the Employees Canadian National Railways.

The tablets will be placed at the following places in the different provinces of the Dominion: Nova Scotia—Halifax depot; Prince Edward Island—Canadian National Hotel, Charlottetown; New Brunswick—Moncton depot; Quebec—Bonaventure depot, Montreal; Ontario—Toronto depot; Manitoba—Winnipeg depot; Saskatchewan—Hotel Bessborough, Saskatoon; Alberta—Edmonton depot; British Columbia—Vancouver depot; and in addition one in the Ottawa depot, Capital of the Dominion of Canada, and one in the headquarters building of the Canadian National Railways, McGill Street, Montreal, making a total of eleven plaques.

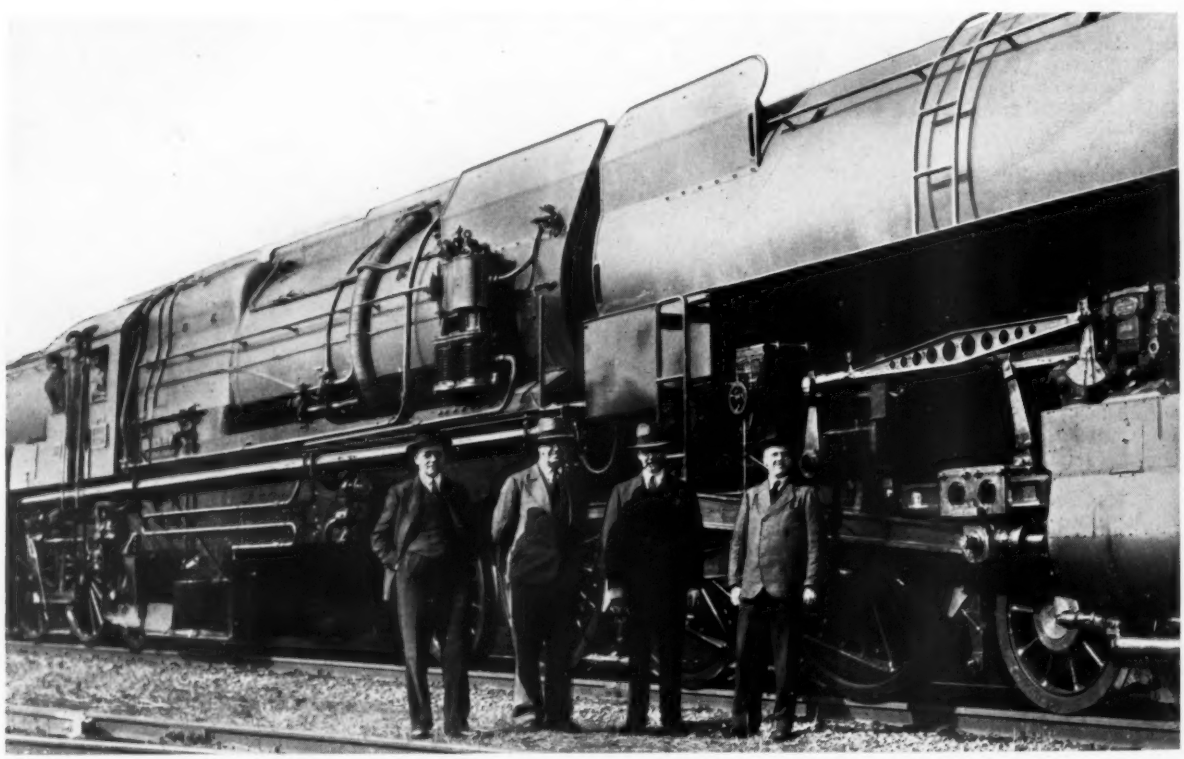
Sir William Forbes, last General Manager of the former L.B.S.C.R., whose death we recorded in our issues of February 14 and 21, left estate valued at £34,538 (£25,210 net).

Mr. A. Cecil Hardy, B.Sc., A.M.Inst.N.A., has been appointed a Director of Welding Supplies Limited, of Charlton, S.E.7. This company is a subsidiary of the Swedish Kjellberg group on the Continent, and is specially concerned with the manufacture of electrodes for welding purposes. Mr. Hardy is also a Director of the Petroleum Times Limited, and Senior Partner of Hardy, Tobin & Company.

The principal speakers at the forthcoming dinner of the Institute of Transport, to be held on April 3 at the Connaught Rooms, London, W.C.2, will be the Rt. Hon. Lord Essendon of Essendon, the Rt. Hon. L. Hore-Belisha, M.P. (Minister of Transport), Colonel Sir Joseph Nall, D.S.O., M.P. (Past President), and the President of the Institute (Sir Cyril Hurcomb, K.B.E., C.B., Secretary of the Ministry of Transport).

I.T.A. Luncheon.—London members of the Industrial Transport Association will hold their annual luncheon on Wednesday, April 1, at St. Ermin's Restaurant, adjacent to St. James's Park station, S.W.1, at 1 p.m. Sir Patrick Hannon, M.P. (President) will take the chair and the guests will include Sir Francis Joseph (President, Federation of British Industries); Sir Cyril Hurcomb (Ministry of Transport); Mr. Theo. Williams (Dock and Traffic Manager, Port of London Authority); Major R. A. B. Smith (Cement and Concrete Association); and Mr. A. L. Castleman (London District Goods Manager, L.M.S.R.).

"The Railway Magazine" Lectures.—Visitors to this year's Model Railway Club Exhibition, to be held at the Central Hall, Westminster, from April 14-18, will be able to attend a series of three lantern lectures arranged by the Editor of our associated contemporary, *The Railway Magazine*. The lectures have been arranged as follow: Wednesday, April 15, at 6 p.m. "Continental Railways," by Mr. W. A. Willox, A.C.G.I., A.M.Inst.C.E., Editor, *The Railway Magazine*; Friday, April 17, at 6 p.m. "Train Speeds," by Mr. Cecil J. Allen, M.Inst.T., A.I.Loco.E.; and Saturday, April 18, at 3.15 p.m., "The Locomotive as a Prototype for Models," by Mr. J. N. Maskelyne, A.I.Loco.E., Editor, *The Model Railway News*. Applications for tickets, price sixpence each lecture, should be made to *The Railway Magazine*, 33, Tothill Street, S.W.1. Admission to the exhibition, 1s. 3d. (children under 12, 6d.), should be paid at the door.



Algerian Beyer-Garratt locomotive (described on pages 615-21) with group at a recent inspection at the Société Franco-Belge workshops at Raismes (Nord), France

Left to right: Mr. Charles S. Lake, Technical Editor, The Railway Gazette; Mons. Edouard Lecluse, General Manager, Société Franco-Belge; Mr. W. Cyril Williams, London Manager, Beyer, Peacock & Co. Ltd.; Mons. G. Deflaux, Chief Locomotive Engineer, Société Franco-Belge

The Permanent Way Institution: Annual Dinner

Mr. W. K. Wallace, Chief Engineer of the London Midland & Scottish Railway Company, took the chair at the annual winter dinner of the Permanent Way Institution, of which he had just been re-elected President, on Saturday last. The function was held at Maison Lyons, Shaftesbury Avenue, and those present included:—

Messrs. A. F. Bound, W. E. Butland, T. N. B. Bates, D. R. Bennett, K. Brinsmead, A. R. Cooper, R. Carpmael, F. E. W. Cox, N. H. Cour-Palais, J. H. Condy, E. H. d'E. Darby, E. R. Dashper, W. A. Dobson, A. W. M. Dyke, N. C. Davis, W. S. Every, C. W. Gibson, E. Greenhalgh, R. Gurd, G. D. Greig, R. S. Griffiths, H. R. Garth, R. W. Gairns, W. Hepworth, H. Janes, J. A. Kay, H. Kirk, C. A. G. Linton, E. Lake, F. Lawson, J. Miller, J. W. Melville, C. F. Minett, S. E. McLewin, H. C. Muggeridge, J. N. Peck, H. M. Proud, A. S. Quartermaine, V. A. M. Robertson, O. F. A. Sandberg, D. Soundy, C. E. R. Sherrington, E. H. Tustain, Major Tofts; Messrs. J. C. L. Train, W. K. Wallace, W. V. Wood, J. B. Woodman, D. B. Williams and W. A. Willox.

Mr. W. V. Wood, a Vice-President of the London Midland & Scottish Railway, proposing the toast of "The Permanent Way Institution," said that the institution, with its membership of between two and three thousand, occupied an unique place in the railway institutions of the country by reason of its widespread membership and the activity displayed by the local sections.

A very noticeable improvement in the condition of the permanent way of the British railways had been effected during the past 10 or 12 years, and experiments were still proceeding with the object of attaining smoother running. In this way the permanent way staff was contributing to increased prosperity in that its members were improving the commodity which the commercial departments had for sale. The Stephensons and Brunels of 100 years ago had laid out a permanent way which, though expensive, was now adding tremendously to the efficient operation of the railways by reason of the easy gradients and curves provided. Mr. Wood was sorry that the war of the gauges had ended as it did, not for traction but for loading reasons; the loading gauge, he considered, was the one that really mattered, and was the one which today constituted a handicap.

On the subject of road competition, Mr. Wood said that it should not be forgotten that railway travel was still the cheapest form of transport on land, though when building railway lines there had been no legacy from a previous form of transport in the shape of a roadway handed over free of charge. Nor was there any assistance from ratepayers.

The institution was to be complimented on what it had done in the past, and what it would do in the future. It was indeed a live institution, and it was a matter for regret that there were not more of its type in railway work. The institution was fortunate in having Mr. Wallace for its President, for despite his very great responsibilities, he remained keenly interested in its welfare.

Mr. R. Carpmael, Chief Engineer of the Great Western Railway, proposed the toast of "The President." He said that three years ago the institution had gone underground for its President, and as a result had been very definitely electrified; Mr. Wallace, as the Chief Engineer of a surface line, had adopted "full steam ahead" as the motto for his second year of office, and would aim at higher and higher speeds with an even greater measure of safety. A good start had been made, for the number of new members elected at the council meeting held that morning almost constituted a record. He desired to wish Mr. Wallace a very happy and successful year of office.

Mr. W. K. Wallace, responding, said that the permanent way was being asked to do more and more for less and less. More trains and higher speeds had to be catered for, and in addition, the luxurious equipment of modern rolling stock meant that more tons per passenger had to be hauled. The demand for increased speed was a matter of considerable importance to the permanent way staff, and one of the advantages of the institution's work was that it enabled a pooling of ideas to take place. Various experiments were being carried out with a view to effecting economies in maintenance, as it was becoming necessary to maintain the track in better condition, but without a proportionate increase in expenditure. The institution was making very good progress, and this was largely due to the efforts of its sectional officers. It was hoped that the year 1936 would see a considerable increase in membership, the primary purpose of which was self-education.

In the unavoidable absence of Mr. G. Ellson, due to indisposition, the toast of "The Guests" was proposed by Mr. Arthur R. Cooper, Chief Engineer of the London Passenger Transport Board, who expressed the members' pleasure at having so distinguished a guest as Mr. Wood. Special mention was also made of Mr. J. A. Kay, whose name, Mr. Cooper said, all would associate with the very able production of THE RAILWAY GAZETTE, Mr. Darby, who was responsible for the largest amount of permanent way in this country; and Mr. Bound, an important figure in the signalling world.

Mr. J. A. Kay, who responded to the toast on behalf of the guests, recalled that he had first attended the institution's winter dinner more than 30 years ago, and referred to former presidents under whose chairmanships he had attended many enjoyable functions.

Mr. N. H. Cour-Palais, who is on leave from India, proposed the toast of "Absent Friends" and referred to the special problems associated with the railways of that country, and to the assistance derived from the *Journal of the Institution*. He desired to mention specially the many members of the institution abroad who would probably never have an opportunity of visiting this country.

Diesel Engine Users' Association: Annual Dinner

At Pagani's Restaurant, Great Portland Street, London, many members and guests assembled on March 18 for the annual informal dinner of the Diesel Engine Users' Association, under the chairmanship of Mr. A. E. Cornewall-Walker, M.Inst.C.E., the President. After an excellent repast and the loyal toast, Mr. Harold Moore proposed "The Association." He mentioned that his connection with the society extended back to 1915, at which period engine builders and lubricant manufacturers were inclined to look askance at its activities, as tending to give wholly unnecessary publicity to any breakdowns that might occur. Later on he was responsible for work on the use of tar oils, which were now again becoming interesting on account of preferential taxation. He doubted whether nationalist legislation which interfered with economic principles could ever be wholly satisfactory. Responding, Mr. A. K. Bruce made a much appreciated and witty speech, containing Scottish and other stories.

The "Percy Still" Medal, awarded for a paper of outstanding merit during the session, was then presented to Mr. P. Belyavin by the President, who alluded to the terms of its institution, and said that the recipient had certainly merited the award. He mentioned the removal of the association's offices to 56, Victoria Street, S.W.1.

Mr. T. Hornbuckle (L.M.S.R.) proposed the toast of "Our Guests." These, he said, represented a very wide range of interests, and he took it that their presence indicated their willingness to assist the aims of the association. With the toast he coupled the name of Major-General A. E. Davidson, with congratulations upon that gentleman's recent promotion. Major-General Davidson, in reply, said that he was both a guest and a member. He valued the work of technical societies, particularly in the personal contacts they facilitated, and he trusted that both military and civilian engineers would be able to co-operate very fully to ensure that money available under the Defence Programme would be wisely spent. Conversion of petrol engines to diesel operation was proceeding apace in the Services. Research on noise prevention seemed necessary in regard to high-speed sets.

Railway Speeds in 1935

4.—France, Belgium, and Denmark

By CECIL J. ALLEN, M.Inst.T.

France

The fourth article of this series deals with the development of railway speed in France and the remaining European countries (apart from Great Britain and Germany, already covered in previous articles) which can boast passenger train schedules at 58 m.p.h. and over in the 1935-36 winter timetables. So far as steam is concerned, there are few changes of note to record in comparing current services with those of 1934 and previous years; but great advances have been made in high speed railcar running, especially by the State Railways. The result, as regards aggregate mileages booked at 58 m.p.h. from start-to-stop, has been to bring the Etat up into second place, although the Nord, as always, more than doubles the high speed mileage of any other French company. Even with steam-hauled services alone, the Nord claims roughly half the French aggregate mileages in all ranges from 58 m.p.h. up to 64 m.p.h. and over, and is also ahead of every railway in Great Britain; on the other hand, the G.W.R. and the L.M.S. both show better figures, in general, than all French railways other than the Nord. At the same time it is satisfactory to note that every French railway now schedules more than a thousand miles daily at speeds of over 58 m.p.h.

In Table A, showing the individual high speed runs of each company, the first two places in the Nord list are taken by the three-car diesel-electric train on the Paris-Arras-Lille-Turcoing services. Despite the diversion into Amiens (instead of the direct route from Longueau to Albert), which involves an additional distance of 3·6 miles and reversal of the train, and also the stops at Arras and Douai, this express now reaches Lille in 2 hr. 37 min., which is within 2 min. of the non-stop time of 2 hr. 35 min. instituted during the short currency of the Paris-Ostend Pullman service. On Sundays the Paris-Lille timing of the railcar actually is 2 hr. 35 min., the run of 81·1 miles from Paris to Amiens being made in 73 min., at a start-to-stop average of 66·7 m.p.h. Nord steam services into Paris from all three principal main lines still suffer by reason of the 3 or 4 min. added to schedules to compensate for loss of time occasioned by the work of rearrangement of the running lines between St. Denis and the Gare du Nord. On the other hand, the adaptation of the Belgian main lines for speeds up to 120 km. (74½ m.)p.h. has permitted acceleration, on the Belgian side of the frontier, of the services which run through, in most instances with Nord locomotives, between Paris and Brussels.

Of these the most notable is the Blue Bird Pullman, now covering the 193·1 miles between the two capitals, in the northbound direction, in precisely three hours, at an average of 64·4 m.p.h. In the southbound direction there is an addition of 4 min. to the time, as a temporary measure, for the reason

TABLE A—DAILY FRENCH RAILWAY RUNS BOOKED AT OVER 60 M.P.H. FROM START-TO-STOP. WINTER, 1935-1936

Railway	Train No.	Departure	From	To	Distance	Time	Speed
					miles.	min.	m.p.h.
Nord	379	17.55	Amiens	Arras	42·1	37	68·3*
	380	12.16	Arras	Amiens	42·1	37	68·3*
	185	13·36	Paris	St. Quentin	95·1	88	64·8
	123	20.00	,,	,,	95·1	88	64·8
	189	18.10	,,	Brussels	193·1	180	64·4 B
	380	12.56	Amiens	Paris	81·1	76	64·0*
	7	16.30	Paris	Etaples	140·5	132	63·9
	115	14.15	,,	St. Quentin	95·1	90	63·4
	379	16.35	,,	Amiens	81·1	77	63·2*
	125	9.10	,,	Charleroi	167·2	159	63·1
	188	10.47	Brussels	Paris	193·1	184	63·0 B
	109	9.15	Paris	St. Quentin	95·1	91	62·7
	309	8.15	,,	Arras	119·6	116	62·2
	126	17.48	Charleroi	Paris	167·2	162	61·9
	1282	18.36	Etaples	Amiens	59·4	58	61·4
	199	11.25	Paris	Brussels	193·1	189	61·3 N
	5	10.40	,,	Etaples	140·5	138	61·1
	167	18.20	,,	Compiègne	51·9	51	61·1
	75	10.30	,,	Boulogne (Ville)	157·5	155	61·0 G
	—	4 runs	,,	Longueau	78·2	77	60·9
	2027	17.15	,,	Amiens	81·1	80	60·8
	167	19.13	Compiègne	St. Quentin	43·2	43	60·3
Etat	143	12.48	Havre	Rouen	54·9	45	73·2*
	151	21.50	,,	,,	54·9	45	73·2*
	152	11.25	Rouen	Havre	54·9	46	71·6*
	142	16.49	,,	,,	54·9	46	71·6*
	143	10.11	Paris	Rouen	86·6	73	71·2*
	151	15.35	,,	,,	86·6	73	71·2*
	152	13.34	Rouen	Paris	86·6	74	70·2*
	142	22.36	,,	,,	86·6	74	70·2*
	NCD	21.08	Alençon	Laigle	43·5	38	68·7*
	¶	4 runs	Paris	Deauville	136·2	120	68·1*
	NCD	18.35	Nantes	Angers	54·7	49	67·0*
	DCN	10.29	Angers	Nantes	54·7	49	67·0*
	DCN	8.11	Laigle	Alençon	43·5	39	66·9*
	NCD	21.47	,,	Elbeuf	69·6	63	66·3*
	DCN	7.06	Elbeuf	Laigle	69·6	64	65·3*
	DCN	9.29	Le Mans	Sablé	29·8	28	63·9*
	DCN	8.51	Alençon	Le Mans	34·8	33	63·3*
	NCD	20.34	Le Mans	Alençon	34·8	33	63·3*
	150	9.48	Bréauté-Beuzeville	Rouen	39·0	37	63·2
	101	8.20	Paris	,,	86·6	83	62·6
	148	8.26	Rouen	Paris	86·6	83	62·6
	150	10.28	,,	,,	86·6	83	62·6
	158	18.26	,,	,,	86·6	83	62·6
	356	18.55	Evreux	,,	66·7	65	61·6*
	DCN	6.51	Rouen	Elbeuf	14·3	14	61·3*
	DCN	9.58	Sablé	Angers	30·4	30	60·8*
	NCD	19.25	Angers	Sablé	30·4	30	60·8*
	327	14.18	Evreux	Lisieux	51·5	51	60·6*
P.O.-Midi	7	14.51	Poitiers	Angoulême	70·2	60	70·2 S
	7	12.43	Les Aubrais	St. Pierre-des-Corps	69·5	62	67·3† S
	15	18.42	,,	,,	69·5	62	67·3†
	DCN	10.29	Angers	Nantes	54·7	49	67·0*‡
	NCD	18.35	Nantes	Angers	54·7	49	67·0*‡
	7	13.51	St. Pierre-des-Corps	Poitiers	63·0	59	64·0 S
	8	17.01	Poitiers	St. Pierre-des-Corps	63·0	60	63·0 S
	7	11.30	Paris (Quai d'Orsay)	Les Aubrais	76·4	73	62·8† S
	191	21.07	Angers	Nantes	54·7	53	61·9
	16	21.07	St. Pierre-des-Corps	Blois	32·9	32	61·7†
	15	17.25	Paris (Quai d'Orsay)	Les Aubrais	76·4	75	61·1†
	16	18.44	Angoulême	Poitiers	70·2	69	61·1
	192	18.50	Nantes	Angers	54·7	54	60·8
	8	15.50	Angoulême	Poitiers	70·2	70	60·2 S
	191	19.56	St. Pierre-des-Corps	Saumur	39·1	39	60·2
	16	19.56	Poitiers	St. Pierre-des-Corps	63·0	63	60·0
Est	31	7.10	Paris	Troyes	103·2	97	63·8
	28	9.09	Nancy	Paris	219·0	211	62·3
	32	15.43	Langres	Troyes	81·0	80	60·8
	29	7.30	Paris	Bar-le-Duc	157·5	157	60·1
	33	13.30	,,	Troyes	103·2	103	60·1
Als.-Lor.	A 59	16.50	Selestat	Strasbourg	26·9	24	67·3*
	A 50	11.14	Colmar	Bolwiller	15·7	14	67·3*
	A 50	11.44	Mulhouse	Basle (St. Louis)	16·7	15	66·8*
	A 55	13.03	Basle (St. Louis)	Mulhouse	16·7	15	66·8*
	L 57	9.44	Mulhouse	Strasbourg	67·3	61	66·2 P
	A 50	10.33	Strasbourg	Selestat	26·9	25	64·6*
	L 56	18.44	,,	Mulhouse	67·3	64	63·1 P
	L 57	10.50	,,	Metz	95·6	92	62·4 P
	L 56	17.02	Metz	Strasbourg	95·6	94	62·1 P
	A 59	16.08	Mulhouse	Colmar	26·5	26	61·2*
	35	21.33	Nancy	Strasbourg	93·2	93	60·1
P.L.M.	4	20.41	Dijon	Laroche	99·0	83	71·4*
	3	9.32	Laroche	Dijon	99·0	84	70·7*
	4	18.50	Lyons	,,	122·1	109	67·2*
	3	10.58	Dijon	Lyons	122·1	111	66·0*
	P 1	16.58	Valence	Avignon	77·3	71	65·3 C
	3	8.00	Paris	Laroche	96·2	91	63·4 *
	P 1	10.20	,,	,,	96·2	94	61·4 C
	P 1	13.43	Dijon	Lyons	122·1	120	61·1 C
	4	22.05	Laroche	Paris	96·2	95	60·8*

NOTES.—* High-speed railcar runs. † Electrically-operated runs. ‡ Etat through railcar service. B Blue Bird Pullman. N North Star Pullman. G Golden Arrow Pullman. P Edelweiss Pullman. S Sud Express. C Côte d'Azur Pullman. ¶ Summer service only.

TABLE B—AGGREGATE MILEAGE OF FRENCH RAILWAY RUNS BOOKED DAILY FROM START-TO-STOP AT 58 M.P.H. AND OVER. WINTER, 1935–1936

Railway	70 m.p.h. and over	68 m.p.h and over	66 m.p.h. and over	64 m.p.h. and over	62 m.p.h. and over	60 m.p.h. and over	58 m.p.h. and over
	miles	miles	miles	miles	miles	miles	miles
Steam Haulage—							
Nord	—	—	—	385 (3)	1,196 (10)	2,402 (21)	4,374 (43)
Est	—	—	—	—	322 (2)	664 (5)	1,578 (13)
P.O.-Midi ..	70 (1)	70 (1)	70 (1)	133 (2)	196 (3)	688 (9)	1,033 (15)
Als.-Lor. ..	—	—	67 (1)	67 (1)	326 (4)	419 (5)	1,022 (14)
P.L.M.	—	—	—	77 (1)	77 (1)	297 (3)	693 (7)
Etat	—	—	—	—	385 (5)	385 (5)	385 (5)
Steam Totals	70 (1)	70 (1)	137 (2)	662 (7)	2,502 (25)	4,855 (48)	9,085 (97)
Diesel and other Railcars—							
Etat	566 (8)	610 (9)	877 (13)	946 (14)	1,046 (17)	1,225 (21)	1,506 (30)
P.L.M.	198 (2)	198 (2)	442 (4)	442 (4)	538 (5)	633 (6)	633 (6)
Nord	—	84 (2)	84 (2)	164 (3)	245 (4)	245 (4)	245 (4)
Als.-Lor. ..	—	—	76 (4)	103 (5)	103 (5)	129 (6)	157 (8)
Diesel, etc., Totals	764 (10)	892 (13)	1,479 (23)	1,655 (26)	1,932 (31)	2,232 (37)	2,541 (48)
Electric Haulage—							
P.O.-Midi ..	—	—	139 (2)	139 (2)	215 (3)	325 (5)	464 (7)
Combined Totals—							
Nord	—	84 (2)	84 (2)	549 (6)	1,441 (14)	2,647 (25)	4,619 (47)
Etat	566 (8)	610 (9)	877 (13)	946 (14)	1,431 (23)	1,610 (26)	1,891 (35)
Est	—	—	—	—	322 (2)	664 (5)	1,578 (13)
P.O.-Midi ..	70 (1)	70 (1)	209 (3)	272 (4)	411 (6)	1,013 (14)	1,497 (22)
P.L.M.	198 (2)	198 (2)	442 (4)	519 (5)	615 (6)	930 (9)	1,326 (13)
Als.-Lor. ..	—	—	143 (5)	170 (6)	429 (9)	548 (11)	1,179 (22)
Total ..	834 (11)	962 (14)	1,755 (27)	2,456 (35)	4,649 (59)	7,412 (90)	12,090 (152)

NOTE.—The figures in brackets indicate the number of individual runs making up each aggregate mileage.

given above, reducing the average speed to 63·0 m.p.h. The North Star Pullman—the other non-stop train on this service, is allowed 189 min. (61·3 m.p.h.) going north, and as much as 197 min. (58·8 m.p.h.) coming south. Many of the other fast Nord runs appearing in this table are made between Paris and Brussels, and as an inter-capital service this probably has no superior or even rival in any part of the world. It is maintained by five *rapides* in each direction daily; the five northbound expresses between them average 193 min. for the 193·1 miles—just a mile-a-minute—while the southbound average works out at 3 hr. 24 min., with a speed of 56·8 m.p.h. The combined average for the ten trains is thus a shade under 58 m.p.h., including all intermediate stops. The 14.15 and 20.00 *rapides* from Paris, the former stopping at St. Quentin and Mons, and the latter at St. Quentin and Aulnoye, both make the 193·1-mile journey in no more than 197 min. Two of the non-stop Paris-Liége runs disappear from the timetable by reason of the insertion of stops in each direction at Charleroi and Namur, but the Paris-Charleroi and Charleroi-Paris runs (167·2 miles) are completed at 63·1 and 61·9 m.p.h. respectively from start-to-stop. The two fastest steam-operated runs on the Nord are those of the 13·36 and 20·00 *rapides* from Paris, booked over the 95·1 miles to St. Quentin in 88 min., at 64·8 m.p.h. start-to-stop; but the Blue Bird Pullman is scheduled to pass St. Quentin from Paris in 85 min. (67·1 m.p.h.).

The Etat list is headed by the four fastest runs in France, made by the two Bugatti railcars which maintain a high speed service twice daily in each direction between Paris and Havre. The overall distance of 141·5 miles, including the Rouen stop, is covered in 2 hr., giving an inclusive average of 70·8 m.p.h., and the start-to-stop speeds of the eight individual runs range from 70·2 to 73·2 m.p.h. The Paris-Deauville non-stop 68·1 m.p.h. Bugatti runs are confined to the summer service, and so are not included in the mileage figures. The other railcars contributing to this table are the one which runs daily from Paris to Caen and back, and the car, connecting with the night steamers from and to Newhaven, which runs from Dieppe via Rouen, Alençon, Le Mans, and Angers to Nantes and back. The latter is one of the most remarkable examples extant of the possibilities in cross-country speed, covering 315 miles of an intricate route, with seven intermediate stops, from Dieppe (Ville) to Nantes in 5 hr. 10 min., and returning in 5 hr. 12 min., which gives an average of just over 60 m.p.h. for the whole of this daily round of 630 miles. The section of this run between Angers and Nantes is over Paris-Orleans metals. As regards steam, the Etat runs at over 58 m.p.h. are confined to four 83-min. journeys over the 86·6 miles between Paris and Rouen, and one slightly faster downhill run over the 39 miles from Bréauté-Beuzeville to Rouen in 37 min., all on the Paris-Havre service.

As regards other runs in Table A, the Paris-Orleans list is headed by the fastest steam-operated journey on the mainland of Europe—70·2 miles from Poitiers to Angoulême in the even hour, by the Sud Express. This figure is the more remarkable when it is remembered that this average must be maintained without the maximum speed exceeding 120 km. (74½ m.) p.h. The southbound Sud Express covers the 362·6 miles from Paris (Quai d'Orsay) to Bordeaux in 5 hr. 49 min., the overall average of 62·3 m.p.h. including four intermediate stops. Even as far as Dax, 454·3 miles from Paris, the time of 7 hr. 33 min. gives an overall average of almost precisely 60 m.p.h., even though the running time over the Midi section of the route, from Bordeaux to Dax, once 89 min. for the 91·7 miles and at that time the fastest run in France, has now for long past been eased out to 97 min. On the Est the fastest long-distance journey is that of the 7·28 a.m. *rapide* from

TABLE C—DAILY FRENCH RAILWAY RUNS OF OVER 90 MILES IN LENGTH WITHOUT INTERMEDIATE STOPPAGE. WINTER, 1935–1936

Railway	Between	Distance	No. of Runs Daily	Fastest		
				Train	Time	Speed
		miles			min.	m.p.h.
Nord	Paris and Liége	226·7	2	18.15 D	236	57·6
Est	Paris and Nancy	219·0	2	9.09 U	211	62·3
Nord	Paris and Brussels	193·1	4	18.10 D	180	64·4
,, ...	Paris and Calais	184·1	3	12.20 D	187	59·1
Est	Troyes and Belfort	171·7	1	8.52 D	183	56·3
Nord	Paris and Charleroi	167·2	2	9.10 D	159	63·1
,, ...	Paris and Boulogne (Tintelleries) ..	157·8	2	18.09 U	160	59·2
,, ...	Paris and Boulogne (Ville) ..	157·5	1	10.30 D	155	61·0
Est	Paris and Bar-le-Duc	157·5	5	7.30 D	157	60·1
,, ...	Laon and Chaumont	147·2	1	20.37 E	162	54·5
Nord	Paris and Etaples	140·5	4	16.30 D	132	63·9
Est	Vesoul and Troyes	132·9	1	16.18 U	140	57·0
Etat	Paris and Le Mans	131·0	6	15.25 D	146	53·8
Nord	Etaples and Laon	125·9	2	18.21 E	129	58·5
P.O.	Paris (Quai d'Orsay) and Vierzon ..	127·3	1	19·25 D•	132	57·9
P.L.M.	Dijon and Lyons	122·1	17	18.50 U†	109	67·2
Nord	Paris and Arras	119·5	5	8.15 D	116	62·2
Est	Chaumont and Belfort	112·3	4	2.01 D	118	57·1
,, ...	Nancy and Châlons-sur-Marne ..	112·1	2	22.12 D	120	56·1
,, ...	Paris and Châlons-sur-Marne ..	106·9	5	8.45 D	110	58·3
Etat	Paris and Dieppe (Ville)	107·1	4	10.17 D 20.57 D	138	46·6
Est	Paris and Troyes	103·2	12	7.10 D	97	63·8
Etat	Le Mans and Rennes	101·5	3	17.58 D	112	54·4
P.L.M.	Laroche and Dijon	99·0	51	19.20 U†	83	71·4
Est	Paris and Reims	96·8	6	9.24 U	98	59·3
P.L.M.	Paris and Laroche	96·2	52	8.00 D†	91	63·4
A.L.	Metz and Strasbourg	95·6	7	10.50 N	92	62·4
Nord	Paris and St. Quentin	95·1	9	13.36 D	88	64·8
A.L.	Strasbourg and Nancy	93·2	8	21.33 E	93	60·1

NOTES.—D Down (from Paris). U Up (to Paris). E Eastbound. N Northbound. • Electrically hauled. † Railcar service.

Strasbourg to Paris, allowed 5 hr. 12 min. for the 312·2 miles, including 5 min. standing at Nancy—again an average of almost precisely 60 m.p.h. throughout. Between Strasbourg and Nancy this express is worked by Alsace-Lorraine engines. The latter's principal contribution to higher speeds in 1935 has been the institution of a new Bugatti railcar service which runs daily from Strasbourg to Basle and back, making a number of intermediate stops. This is permitted to travel at maximum speeds up to 140 km. (87 m.)p.h. On the P.L.M. the Paris-Lyons Bugatti service which figures in Table A was replaced in mid-winter by a four-coach streamlined set of cars hauled by a streamlined Atlantic locomotive, and owing to the limitation of maximum speeds still imposed on steam, it has been necessary to reduce the speed of this service to something but little higher than that of the Côte d'Azur Pullman.

A separate table (C) gives details of the non-stop runs in France which exceed 90 miles in length, headed by the Paris-Liége runs (226·7 miles) of the Nord and the Paris-Nancy runs (219·0 miles) of the Est; these are the longest non-stop runs on the mainland of Europe, and it is well to remember that they are performed without the assistance of water-troughs, so that it is necessary to use tenders of exceptional water capacity. The largest number of runs in the table is that of the P.L.M., which is responsible daily for 120 out of the grand total of 222, though the longest of these is only 122·1 miles in length (Dijon-Lyons), and the total is composed mainly of 51 runs between Laroche and Dijon and 52 between Paris and Laroche, all between 90 and 100 miles in length. The last-mentioned witness to the extraordinary density of the fast traffic over the P.L.M. line between Paris and Dijon. Next after the P.L.M. comes the Est, with 39 runs; then the Nord, with 34; the Alsace-Lorraine, with 15; the Etat, with 13; and the Paris-Orleans with one single example, electrically-hauled, from Paris to Vierzon—the Barcelona Express, which is the only train to pass through Les Aubrais without stopping. During the summer season the Etat has a considerable accession of long runs, such as Paris-Saumur (four runs of 177·4 miles), Paris-Caen (two runs of 148·4 miles), Paris-Briouze (2 runs of 140·0 miles), the four Bugatti railcar two-hour runs over the 136·2 miles between Paris and Trouville-Deauville, and two railcar runs of 154·3 miles between Paris and Bagnoles de l'Orne. The French grand total of 222 runs compares with 161 in Great Britain, but this country leads in runs of 119 miles in length and over—71 against the French 59—and is also responsible for the four longest all-the-year-round non-stop runs in the world.

Belgium

Brief reference may be made, in conclusion, to speed developments during 1935 in other European countries. Belgium now has twelve runs (393 miles) booked at 60 m.p.h. and over, and 18 runs (626 miles) booked at 58 m.p.h. and over. Over the 32·3 miles between Brussels (Midi) and Ghent six westbound and five eastbound *trains blocs* run daily in 32 min., at 60·6 m.p.h. start-to-stop; two more are booked from Ghent to Brussels in 33 min., at 58·7 m.p.h. Two trains cover the 25·3 miles from Ghent to Bruges in 26 min. (58·4 m.p.h.), and a mid-morning express is booked over the 37·5 miles from Mons into Brussels (Midi) in 37 min., at 60·8 m.p.h. A striking run is that of the 20·00 *rapide* from Paris to Brussels, which is worked by a Belgian National locomotive over the 59·2 miles from Aulnoye (France) into Brussels in one hour; similarly the 9.15 from Paris is worked from Aulnoye in 61 min., at 58·2 m.p.h. The only non-stop runs in Belgium exceeding 100 miles in length are those of the Edelweiss Pullman over the 102·5 miles between Namur and Luxembourg, performed in the very creditable time—in view of the extremely difficult gradients, as steep in parts as 1 in 60, through the Ardennes—of 126 min. southbound and 124 min. northbound. The latter timing calls for an average speed of 49·6 m.p.h.

Denmark

In Denmark, since the introduction of the three diesel-operated *Lyntog*, or "lightning trains," there has for the first time on record been a mile-a-minute run in the Danish timetables, as well as two non-stop runs exceeding 100 miles in length. The former is from Roskilde to Slagelse, 38·3 miles in 38 min., at 60·4 m.p.h.; and the latter are over the 123·1 miles between Aarhus and Nyborg, covered in 126 min. in the northbound direction (58·6 m.p.h.), and in 124 min. coming south (59·6 m.p.h.). This stretch includes the crossing of the new Little Belt bridge. In all, six journeys of the diesel trains, totalling 438 miles, are performed at over 58 m.p.h., but no Danish steam schedules reach so high a level of speed as this.

Other Countries

As announced some time ago, an extensive introduction of high-speed railcars was intended in Poland, but these have not yet materialised, pending delivery of the cars, and the only fast railcar service yet running in that country—three times in each direction daily between Warsaw and Lodz ($80\frac{3}{4}$ miles covered non-stop in 88 min.)—does not attain to the 58 m.p.h. standard. In Italy, also, owing to war conditions, various expected accelerations have not yet taken place, and some slight slowing of the fast Milan-Venice services has resulted in no timing as fast as 58 m.p.h. from start-to-stop being left for the moment in the Italian timetables.

HARD RUNNING ON THE L.N.E.R., G.C. SECTION.—The insertion in the schedule of the 6.20 p.m. express from Marylebone to Bradford of stops at Finmere and Woodford, in place of the slip coaches formerly detached at those places, has produced one of the hardest bookings in the history of the Great Central system. What is more remarkable is that the haulage of this train is still entrusted to the 30-year-old G.C. Atlantics, which at the present moment would appear to be doing finer work than at any time in their long career. On a recent trip, No. 5363 ran the 59 miles from Marylebone to Finmere in 66 min. 50 sec. in spite of a permanent way slack costing 3 min.; the 15·3 miles from Princes Risborough to Grendon junction were covered at an average speed of 75·2 m.p.h., including a maximum of 88 m.p.h. at Haddenham. On the 60 m.p.h. booking over the 34 miles from Woodford to Leicester, $1\frac{1}{2}$ min. were gained. For 27 miles of this section an average of 71·3 m.p.h. was maintained; this included a minimum of 56 m.p.h. up four miles at 1 in 176, and a long sustained 87 m.p.h. on the final descent into Leicester. The load throughout was one of 260 tons behind the tender.

M. & G.N. AMBULANCE COMPETITIONS.—In the annual competition at Norwich on February 19 the shield was won by Melton Constable for the first time, with 235 points out of a possible 334. The points gained by the remaining five teams were: Moulton, 214; Sheringham and South Lynn, 213; Terrington, 194; Yarmouth, 127. The judge, Dr. Gentle, of Attleborough, commented very favourably on the standard of work, and the President of the Centre, Mr. R. B. Walker (Traffic Manager), spoke in appreciative tones of the keen interest taken in ambulance work on the M. & G.N. Joint line. On March 4 the Challenge Cup competition at Norwich resulted in a win for the South Lynn team with $287\frac{1}{2}$ points out of 398. Holbeach was second with 221 points; Yarmouth, third (217); Wisbech, fourth ($208\frac{1}{3}$); and Cromer, fifth ($167\frac{5}{6}$). Dr. F. E. Bendix, of London, who judged the competition, was very pleased with the progress that had been made by the teams since he adjudicated last year, and described the standard of first aid work on the railway as very good indeed. The South Lynn team will again represent the joint line in the preliminary inter-railway competition in London today (Friday).

CREWE PUPILS AND PREMIUMS.—The 46th annual dinner of past and present Crewe pupils and premiums will be held this year on Friday, May 1, at the Trocadero Restaurant, Piccadilly, W.1. Past and present Crewe men who wish to attend should communicate with Mr. Reginald Terrell, Terrell's Wharf, Townmead Road, S.W.6.

THE MONTH'S RAILWAY LAW

Fogs and Accidents

Schlarb v. London & North Eastern Railway Company. (*The Times*, January 30.)

Fogs have paid a prominent and unpleasant part during the past winter in the toll of accidents by rail and road. In the above case Miss Schlarb was injured by a fall from the platform on to the line at Clapton station in a dense fog. She had taken her ticket and gone down the stairway leading to the platform which had a distance of three yards to its edge. The station lamps were lit, but according to the evidence Mr. Justice Atkinson found that there was no lighting which was of any help to Miss Schlarb in the fog when she reached the platform. There were several turns on the stairs, and it was not to be expected that she would know which way the platform ran. She stepped over on to the line and broke her leg. She then dragged herself from the rail to the edge of the platform, but was struck by an approaching train. The engine driver and a porter lifted her on to the platform.

The railway company in defending an action for damages pleaded that they were not liable, because the plaintiff must have known of the danger. They said that she should have been put on her guard by the state of the weather and the position of the platform, and therefore the company could not be liable—*Brackley v. Midland Railway Company* (85 L.J. K.B. 1596). That is undoubtedly the true position as between invitor and invitee. The Judge, however, took the view that the station officials, knowing the risk to persons descending the stairs, ought to have provided lighting which would have been visible to them. He awarded the plaintiff £1,000 damages, saying that she would be a cripple for the rest of her life. The facts were almost identical with those in *London Tilbury & Southend Railway v. Paterson* (1913).

The Duty of Station Officials

London Tilbury & Southend Railway v. Paterson. (29 Times, L.R. 413.)

In this case there was the same sort of accident at Upton Park station as that in Miss Schlarb's case at Clapton. The House of Lords there laid down the duty of railway officials in case of fog so clearly that their judgments should be borne in mind. It is not suggested, they said, that the plaintiff should have remained at the foot of the staircase with her hand on the rail, nor that she did anything unreasonable in walking away from the staircase in the middle of the platform. The company had "invited" the plaintiff to walk down to the platform and wait upon it until her train should arrive. In these circumstances it was their duty to take reasonable steps to protect her effectively from the dangers incidental to her actions. If the company could not provide light sufficient to protect her, they should have provided some adequate substitute to acquaint her with the presence of the dangers which her own eyesight would have revealed to her had there been a light. It is to be noticed that in these cases there is usually some evidence that a porter called out to warn passengers of the danger, but it is difficult to prove this, and, even so, it is more difficult still to prove that the warning reached the plaintiff's ears.

The Railway Assessment Cases

Whatever else may be extracted from the judgments of the House of Lords in the Southern Railway Rating Appeals, it is clear that the basis of railway rating is now as ever the rent at which the railway hereditaments might reasonably be expected to be let to a hypothetical tenant. The only difference created by the Railways (Valuation for Rating) Act, 1930, was the provision that the value of the undertaking must in future be ascertained "as a whole," and then apportioned, instead of attempting to ascertain the earning capacity of the railway in each particular parish, as was done previously. Further than that, the Assessment Authority must still calculate the amount of capital required by the hypothetical tenant for working the undertaking and allow him a percentage thereon. It was contended that the hypothetical landlord was also entitled, having regard to the large amount expended by him in creating the railway, to some proportion of net profits, but the House of Lords did not take this view. Before the Act of 1930 the universal practice was to make a deduction by means of a percentage on the tenant's capital and the Act did not direct any departure from that practice. The Lord Chancellor indeed said that there might be circumstances in which some other method would be adopted, but those circumstances did not exist in the case of the Southern Railway. As regards the deduction or allowance in respect of the tenant's capital, Section 4 (2) of the Act enables the Assessment Authority to disregard old customs. Here the House of Lords affirmed Mr. Justice Mackinnon in deciding against the railway company as to the old way of valuing rolling stock, and—in the case of rolling stock manufactured by the company—of adding to the cost a percentage to represent manufacturers' profit.

It is to be observed that in the case of the last accounts of the London & North Eastern Railway Company the directors took no credit for sums which they might have overpaid in respect of rates having regard to the House of Lords' decision. In view of the "open door" in the judgments of the House of Lords they were probably wise in this conservative policy, but there is no ground for supposing that different considerations will apply in their case. The effect of the decisions is to affirm the Railway and Canal Commission, who must be taken to have rightly construed the Act of 1930. The assessment value in the case of the Southern Railway Company is therefore £1,077,331 instead of £2,180,000 at which it was put by the Railway Assessment Authority.

Railway Cases in the Lords

The position of railway cases upon appeal to the House of Lords is that the cases of Central London Railway and the London Electric & Metropolitan Railway Companies against the Inland Revenue Commissioners have been adjourned for further consideration. The appeals of the Railway Assessment Authority and the London County Council as against the Southern Railway Company were dismissed on January 24. Finally the appeal of the London & North Eastern Railway Company in their rating case against the North Riding of Yorkshire County Council was dismissed on February 10.

Road & Rail Traffic Appeals

A group of interesting decisions appears in the first part of the current volume of "Railway and Canal Traffic cases" lately decided by the Road and Rail Traffic Appeal Tribunal. In the *London & North Eastern Railway and Hagan* (page 31) a carrier who also had a coal business applied for an A licence. It appeared from his business books that his vehicle was not used "mainly for carriage for reward" during the past year. The Road and Rail Traffic Act, 1933, puts the burden on the applicant of showing that no other carrier in the district could do the work. This the applicant was not able to prove and, in consequence, the tribunal held that the licence should have been refused, although there was no evidence to show that the transport facilities in the district were more than were required.

The *Sussex Carriers' Association case* (page 64) explains the meaning of the word "Association." The Road and Rail Traffic Act, 1933 (Appeal Tribunal) Rules, 1934 (r. 11 (2)), give an officer of an "association" right of audience before the tribunal, and the tribunal certifies an association as one "representing a substantial number of persons interested in or likely to be affected by the decision of the tribunal."

The "Sussex Carriers' Association" was registered under the Registration of Business Names Act, 1916, as the *business name* of the secretary of the association. The association had 182 members, who owned in all 605 motor vehicles. It had no banking account

other than the private account of the secretary. The management was vested in an executive committee, of whom a president was to be a member, but none had been elected. The tribunal held that this was not an association or body of persons which came within the meaning of the above rule.

In *Southern Railway Company and Owen* (page 36) a carrier was granted an A licence under the Road and Rail Traffic Act, 1933, s. 7, subject to a condition that he should use his vehicle only for the traffic of Company A. Company A came under the control of Company B, who also desired to employ him. He applied for an A licence without condition. The tribunal vetoed the licence because it appeared that he was not the only carrier capable of dealing with the traffic. They followed *Euston & Company v. London Midland & Scottish Railway Company* (Rail and Canal Traffic cases, vol. 22, page 3), in which the tribunal imposed on the applicants the duty of showing that the work could not be done by other carriers already engaged in carriage, whether by road or rail.

G.W.R. (London) Lecture and Debating Society

Following the annual meeting of the G.W.R. (London) Lecture and Debating Society at Paddington station, on March 19, three young members of the Society (Messrs. W. G. Roberts, N. S. Taylor, and A. M. Webb) initiated a discussion on the subject: "That employees should be paid what their individual services are deemed to be worth." Mr. S. G. Rowe (Assistant Secretary, G.W.R.) presided.

The debate covered a wide range of views on the present methods of fixing remuneration in industry generally, and on the railways in particular. The majority of speakers saw difficulties in applying the suggested principle, and approved in general the present methods of collective agreement by negotiation on broad classes or grades of work. The difficulty of legislating for the "square peg in the round hole" was also mentioned, it being suggested that a man whose services were only average or sub-average in one job, might be far more valuable in a class of work for which he had a natural flair.

It was also argued that the absence of any satisfactory method of favourable discrimination in the case of employees whose services are above the average was a defect of the present system of determining wages and salaries, and that success in examinations might with advantage be recognised by additional payment.

A prize for the best speech of the evening (by a man under 30) was awarded by popular vote to Mr. W. G. Roberts, of the General Manager's office.

QUESTIONS IN PARLIAMENT

Railway Carriage Doors

Mr. Day, on March 18, asked the Minister of Transport whether his attention had been drawn to a compartment door of a train at Laindon, Essex, being opened before the train had stopped at the station, in which more than 30 people standing on the platform were injured; and would he consider asking the railway companies to have doors fitted on steam trains similar to those fitted on electric trains, which could not be opened until the train had stopped at the station platform.

Mr. Hore-Belisha: The L.M.S.R. informs me that the adoption of the suggestion contained in the hon. Member's question would involve the replacement of the whole of its stock with new vehicles, and in view of the danger which would exist from automatically locking passengers in on ordinary trains, I am not prepared to press the companies in the direction indicated.

Deptford Creek Bridge

Mr. Walter Green asked the Minister of Transport if he was aware that the Southern Railway ran across a wooden bridge over Deptford Creek and was responsible for holding up river traffic, and thus interfering with employment through vessels not being able to reach McCalls' wharf; and whether he would take steps to put an end to this obstruction of traffic.

Mr. Hore-Belisha: The bridge carrying the railway over the creek was authorised by Parliament.

Season Ticket Regulations

Major-General Sir Alfred Knox asked the Minister of Transport if he would ascertain whether the railway companies would permit a holder of a season ticket to deposit his ticket at the local booking office before proceeding on his annual holiday and to receive it back on returning from his holiday, with the date of expiry of the ticket extended by the number of days spent on holiday.

Mr. Hore-Belisha: I will communicate with my hon. and gallant friend when I receive a reply from the railway companies.

Underground Railway Extension

Sir John Power asked the Minister of Transport whether any plans were on foot for the extension of the tube train service from Morden to Hook, under the Government's public works schemes to relieve the unemployed.

Mr. Hore-Belisha: The London Passenger Transport Agreement was to secure the early provision of urgently needed facilities in accordance with an agreed programme of which my hon. friend will be aware. The London Passenger Transport Board reports that the railway to Morden is already working to capacity and there is not sufficient margin to admit of operating additional traffic to Hook.

Orders of Railway Material for India

Mr. Day on March 23 asked the Under-Secretary of State for India whether he could give the value of orders for locomotives and any other railway material purchased for Indian railways and placed in Continental countries for the 12 months ended to the last convenient date.

Mr. Butler.—The value of the orders for railway material placed in Continental countries for Indian State-owned railways during the calendar year 1935 was about £1,000,000.

Railway Liability

Mr. Pethick-Lawrence asked the Minister of Transport whether he had considered the representations submitted by commercial travellers and other regular users of special term facilities on the railways as to the conditions imposed on holders of cheap tickets depriving them of any redress for injury to person or loss of property; and whether he was prepared to take any action in the matter.

Captain A. Hudson (Parliamentary Secretary).—The main line railway companies inform the Minister of Transport that, excluding workmen, it has been decided that this limitation will in future apply only to passengers holding cheap day, half-day, or evening tickets.

A Crawley Level Crossing

Captain Strickland on March 24 asked the Minister of Transport whether he was aware that the Southern Railway Company was denying access to a road situated on the outskirts of the town of Crawley by closing the level-crossing gates throughout the night; and what action he proposed to take in the matter.

Captain A. Hudson (Parliamentary Secretary).—The Minister is aware that between 10 p.m. and 8 a.m. it is necessary to ring the bell to call the gateman to open the gates near Crawley on the Horsham Road (A.278), but he has no power to require the railway company to alter its arrangements at this crossing. He has, however, agreed to make a grant towards the cost of a by-pass and new bridge over the railway close to this point, work on which is to begin on April 1.

IMPROVEMENTS TO CHESHAM AND CHALFONT STATIONS.—Owing to the increased traffic on the Chesham Line, it has been decided to make some improvements to the passenger accommodation at Chesham and Chalfont stations. The existing rooms at Chesham station, which at present house the station-master and ticket office, are to be made into one large ticket hall. The station-master's office will be transferred to a renovated room on the platform. Passengers at Chalfont station will be given complete protection from the weather by the lengthening of the roofs on both platforms, *i.e.*, by 133 ft. on the Down platform and by 200 ft. on the Up. The existing waiting room on the branch line platform will be demolished and a new one built.

RAILWAY AND OTHER REPORTS

Buenos Ayres Western Railway.—It is announced by the board that the question of the payment of dividends upon the preference stocks of the company will be considered when the accounts for the year ending June 30, 1936, are completed.

Buenos Ayres Great Southern Railway.—The board of the Buenos Ayres Great Southern Railway Co. Ltd. announces that the question of the payment of dividends upon the preference stocks of the company will be considered when the accounts for the year ending June 30, 1936, are completed.

Bilbao River & Cantabrian Railway.—The report for the year 1935 shows a net revenue balance, including £3,318 brought in, of £4,216. The directors propose to pay a dividend of 4 per cent. on the ordinary shares, to pay £1,000 to the employees' pension fund, and to carry forward £936. The tonnage of minerals, carried for shipment decreased by 20,347 tons, and miscellaneous traffic showed a reduction of 3,723 tons, but minerals carried for local consumption increased by 13,750 tons. Total tonnage carried was 153,155 tons.

Sheffield & South Yorkshire Navigation Company.—The gross profit for 1935 amounted to £15,027 (against £15,614 for 1934) and the net revenue, after interest charges and again placing £2,800 to mortgages redeemed suspense account, to £8,089 (against £8,094). Holders of the 4½ per cent. non-cumulative preference stock are again to receive a dividend of 1¼ per cent. for the year, and the balance forward is increased from £13,543 to £13,820. Traffic increased by 13,034 tons to 670,982 tons, but tolls, &c., decreased by £1,316

Southport & Cheshire Lines Extension Railway.—For the year ended December 31, 1935, the gross receipts, after adjustment (including amount payable by the L.M.S.R. for the year ended June 30, 1935, in respect of the Lancashire & Yorkshire Railway Guarantee), were £19,269, compared with £19,219, but expenditure rose from £11,758 to £11,867, and the balance of £7,402 carried to net revenue account showed a decrease of £59. Net revenue account, including £1,398 brought in, showed, after payment of debenture dividend, a balance of £3,057, out of which the directors recommend a payment of 2 per cent. on the 2½ per cent. preference stock, leaving £1,557 to be carried forward.

Oldham, Ashton-under-Lyne & Guide Bridge Junction Railway.—Gross receipts for the year 1935 were £19,762, against £20,325 in 1934. Expenditure decreased by £312 to £25,548. Adding miscellaneous receipts (net) and deducting miscellaneous charges leaves a net revenue deficit of £4,317, against £4,054, but the amounts receivable under lease from the L.M.S.R. and L.N.E.R. leave a balance available for dividend of £1,900. This enables a dividend of 4¾ per cent. to be paid on the £40,000 share capital held by the public. Total passenger train receipts were £8,926, a net improvement of £102. Ordinary passengers were up both in numbers and receipts, but workmen, seasons, and parcels brought in less. The goods train receipts of £10,321 were £708 down.

Grand Union Canal Company.—Gross receipts for the year 1935 amounted to £227,456, compared with £239,151 for 1934. Tonnage receipts, at £124,791, were £1,794 lower, and rents (£100,657) brought in £10,501 less, chiefly because of sales of certain properties. Working expenses, at £151,385, showed a decrease of £19,629 owing to the great reduction in pumping expenditure. The amount at the credit of net revenue account is £97,034, against £88,047 in 1934. After meeting debenture interest and other charges, there is a balance of £24,213, which, added to £10,969 brought in, gives a total of £35,182. The preference dividend takes £24,000, leaving £11,182 to be carried forward.

Cordoba Central Railway.—As the company is still unable to resume the payment of interest on its 4½ per cent. first debenture stock, the board has decided, with the concurrence of the trustees, pursuant to the powers in that respect conferred upon the company by the scheme of arrangement sanctioned by the Court on July 25, 1932, to postpone until October 1, 1936, or until such later date as may with the concurrence of the trustees hereafter be determined, payment of the half-year's instalments of interest on the company's first debenture stock which fell due on October 1, 1934, and April 1 and October 1, 1935, respectively, as well as of the further half-year's instalment of such interest which falls due on April 1, 1936. The directors regret to state that the net revenue for the first eight months of the current financial year shows no material improvement over that for the corresponding period of the previous year.

English Steel Corporation Limited.—This undertaking, which was formed in 1929, is controlled by Vickers-Armstrongs Limited. The report for the year 1935 shows a trading profit of £845,204 (against £498,908 for 1934) and a net profit, before providing for depreciation, of £783,223, which compares with £435,638 for the previous year. The sum of £150,000 is charged for depreciation, and the sum of £100,000 is written off under works reconstruction schemes, leaving a balance of £522,218. Dividends of 7 per cent. (less tax) on the preferred ordinary shares absorb £120,917 and of 20 per cent. (tax free) on the deferred ordinary shares absorb £56,556, and the sum of £300,000 is appropriated to reserve account. The amount carried forward is £61,864, against £17,120 brought in. These dividends are the first declared since the formation of the corporation. Reconstruction of the Vickers works is proceeding satisfactorily. The Cyclops works which have been closed since 1929 have been re-opened, and steps are being taken to re-open the works of the Darlington Forge Limited (a subsidiary company), which have been closed since 1932.

British Thomson-Houston Co. Ltd.—The directors announce that the profit for the year 1935, after all expenses and charges other than interest on debentures and loans, and after income tax, amounts to £476,633 against £356,435 for the previous year. A sum of £162,433, against £116,008, is allowed for plant depreciation, while the general reserve receives £63,232 from profits of the year and £69,617 from amount brought in from the previous year of £250,813, bringing the general reserve to £250,000. The dividend recommended on the ordinary shares is 5 per cent., against 3 per cent. for the previous year, leaving £181.197 to be carried forward.

British Automatic Co. Ltd.—The report for the 15 months to December 31 states that the profit, after charging debenture interest of £21,927 (against £20,000), was £37,444. This compares with £24,261 for the year to September 30, 1934. The directors have allocated to depreciation and renewals account £19,137 (against £10,800), to contingency reserve £1,878 (against £10,715), and to writing down stock £5,000 (against nil). A dividend is recommended of 4 per cent. actual for the 15 months, which will absorb £12,400, and leave £7,040 (against £8,011) to be carried forward. The takings of machines show an increase over those of the previous corresponding period.

West Yorkshire Road Car Co. Ltd.—This company, which is controlled jointly by the L.N.E.R. and L.M.S.R. Companies and Tilling & British Automobile Traction Limited, secured in the year 1935 a net profit, after deducting charges for depreciation, directors' fees and income tax reserve, of £67,643, compared with £58,044 for 1934. Adding £12,080 brought forward gives a total of £79,723. The dividend on the 6½ per cent. preference shares takes £13,000 and the 10 per cent. dividend (5 per cent. interim and 5 per cent. final) takes £54,000, leaving £12,723 to be carried forward. The issued capital was increased during the year to £740,000 by the allotment of 90,000 ordinary shares of £1 each. Sites were acquired during the year for the construction of omnibus stations. The subsidiary undertaking, the Harrogate Carriage Co. Ltd., has been liquidated, and the business merged with that of the company.

Forthcoming Meetings

May 6 (*Wed.*)—**Canadian Pacific Railway Company** (Annual General), Head Office, Montreal, at 12 noon, followed by Special Meeting.

NOTES AND NEWS

Garrowhill Halt, L.N.E.R.—On March 16, Mr. George Mills, Divisional General Manager, Scottish Area, L.N.E.R., opened a halt at Garrowhill, on the outskirts of Glasgow, to serve a new housing development area.

West End Passenger Agents.—Tourist and travel agents from France, Belgium, Switzerland, Holland, and Germany, were guests at an assembly of 450 at the fortieth anniversary dinner of the West End Passenger Agents at Grosvenor House, London, on March 18. The chair was taken by Mr. P. A. Clews, European Manager of the Canadian National Railways.

New Halt for East Tilbury, L.M.S.R.—A new halt, to be known as East Tilbury, is to be provided by the L.M.S.R. This halt, on the Tilbury-Pitsea line, will be situated immediately on the Tilbury side of Muckingford crossing, between Low Street and Stanford-le-Hope stations. In addition to improving the passenger facilities of the district generally, it will cater largely for the workpeople of a large boot-and-shoe factory in the vicinity.

Canadian National Railway Bridge Destroyed.—Canada did not escape the recent deluge and floods which were so disastrous in the United States. The C.N.R. bridge across the St. John River, between Fredericton and South Devon, was swept away on the night of March 19-20, when a great ice-dam on the flooded river burst. As a result rail communications in New Brunswick were seriously dislocated and the damage done is estimated at £300,000.

Road Accidents.—The Ministry of Transport return for the week ended March 21 of persons killed or injured in road accidents is as follows. The figures in brackets are those for the corresponding period of last year :—

	Killed, including deaths resulting from previous accidents		Injured	
England ...	96	(79)	2,953	(2,501)
Wales	5	(5)	141	(97)
Scotland ...	7	(16)	290	(253)
	108	(100)	3,384	(2,851)

The total fatalities for the previous week were 89, as compared with 105 for the corresponding period of last year.

L.M.S.R. Quota League Prize Giving.—On Wednesday last Sir Josiah Stamp, Chairman of the L.M.S.R., presented prizes at Euston to the winners of the company's Quota League competitions in 1935. Mr. Ashton Davies, Chief Commercial Manager, presided, and was supported by Mr. E. J. H. Lemon, Vice-President, Railway Traffic Operating and Commercial Section. The winners, whose results were commented upon editorially in our issue of March 13, were : Passenger League, Barrow-in-Furness ; Goods League, Northampton ; Coal League, Stoke-on-Trent ; and Port League, Fleetwood. Awards were also made to 117 stations which had achieved the best results in their respective districts. Scottish prize-winners will receive their awards at a later date.

L.N.E.R. Boxing Championships.—At the L.N.E.R. boxing championships at the Stadium Club, High Holborn, on March 24, L. Case, the A.B.A. bantam-weight champion, successfully defended his title against R. Scott, who, however, put up a courageous fight against an opponent who was markedly his superior. All the contests were keenly contested, and several former title-holders gave place to promising new champions. Sir Murrough J. Wilson presented the cups and medals after each final.

Extension of Electrification in Italy.—It is understood that an additional 800 miles of the Italian State Railways are to be electrified, including the Bologna-Milan main line, the line onwards to the Swiss frontier and the coast main line southwards from Leghorn to Rome. By 1938 both routes from Rome northwards to the French and Swiss frontiers respectively should be equipped for electric traction throughout. South of Rome electrification of the remaining length to Reggio, on the Strait of Messina, from Salerno, is now proceeding.

Railway Wages.—A further conference took place on March 25 between the railway general managers and the three railway trade unions. The claim of the unions for the abolition of the deduction of 2½ per cent. from all earnings and for the readjustment of certain conditions of service as determined by Decision No. 119 (dated March 5, 1931) of the National Wages Board, was again considered. After discussion it was agreed that the meeting should stand adjourned in order that consideration might be given to certain proposals which were discussed with a view to reaching a settlement.

London Coastal Coaches Anniversary.—The fourth anniversary of the opening of the Victoria Coach station was celebrated by London Coastal Coaches Limited, on March 19, and the occasion was made an opportunity for the inauguration of the new road travel scheme described and illustrated on page 520 of our issue for March 13. An attractive brochure was handed to each guest on arrival, and therein was set out a summary of the activities of London Coastal Coaches, including an interesting series of operating figures. Between them, the 38 operating companies (all of which with the exception of four are railway associated) using the station, own or control 1,981 double-deck buses, 2,381 coaches, 8,327 single-deck buses, or 12,689 vehicles in all. In the course of a year 394,868,729 bus miles and 47,621,237 coach miles are completed, and the number of passengers carried totals 1,574,002,369. The capital invested in the associated companies and their subsidiaries amounts to £28,000,000.

More G.W.R. Diesel Railcar Services.—On Monday last, March 23, the G.W.R. streamlined diesel railcar No. 14 was brought into service to work 17 existing steam-train services, and also to provide two new passenger services, in the Newport, Chepstow, Monmouth, Pontypool Road, Panteg, and Blaenavon area. This brings the daily number of G.W.R. diesel railcar services up to 121.

Interpreters at Berlin Stations.—Courses of instruction in English and French are being given to German State Railway officials who will be serving at the important railway termini of Berlin when visitors arrive for the Olympic Games in the German capital in August. Other officials with knowledge of the Italian, Polish, and Swedish languages are to be attached to the termini at which trains from those countries arrive.

The Western Section of the G.C.R.—At the monthly meeting of the Railway Club, held on March 12 at the Royal Scottish Corporation Hall, Fetter Lane, Mr. E. Woodruffe-Peacock read an interesting paper entitled "The Western Section of the former Great Central Railway." The lecturer traced the history of this section from the passing of the original Manchester & Sheffield Railway Bill in 1831 to the present day, with special reference to the famous Woodhead Tunnel. He also referred to the Cheshire Lines Committee, and the Wrexham, Mold & Connahs Quay Railway, and mentioned the Leicester to Aberystwyth through coach as an outcome of these extensions.

Canadian National Railways Management Reorganisation.—Messages from Ottawa, dated March 24, anticipate the introduction by Mr. Howe, Minister of Railways, of a Bill in Parliament, providing for the reorganisation of the Canadian National Railways management. In the new scheme, Mr. S. J. Hungerford, the present President, is, in addition, to become Chairman, in place of Mr. C. P. Fullerton, who is retiring. Instead of the present board of three trustees, there will be seven directors, and it is hoped that the change will avoid political interference, though securing closer co-operation with the Government in matters of general policy.

Northern Ireland Traffics in 1935.—On railways wholly in Northern Ireland, the number of passengers (exclusive of season-ticket holders) carried during the whole year 1935 was 5,775,523, against 5,633,569 in 1934, and receipts from passengers were £265,358, compared with £255,355. Merchandise and minerals carried in 1935 were 552,170 tons, against 529,183 tons in 1934, and the total receipts from goods traffic were £188,071, compared with £177,091. On railways partly in Northern Ireland, passengers in 1935 numbered 5,895,948, against 5,231,995 in 1934, and passenger receipts were £440,661.

London Transport Bills

A Select Committee of the House of Commons under the Chairmanship of Sir Henry Cautley began on Tuesday the consideration of the three bills promoted respectively by the L.P.T.B., L.N.E.R. and G.W.R. for carrying out the scheme of London Transport improvement arranged with the Government last June. This scheme, then estimated to cost £35,000,000, has been enlarged so as to cover a total of about £42,286,000. It includes (*i*) an electrification and tube extension scheme in North-East London estimated to cost £14,445,000, of which £9,815,000 will be provided by the London Passenger Transport Board and £4,630,000 by the L.N.E.R.; (*ii*) an electrification and tube extension scheme in North London estimated to cost £5,220,000, of which £3,373,000 will be provided by the London Passenger Transport Board and £1,847,000 by the L.N.E.R.; and (*iii*) a western extension to Ruislip, involving the construction and electrification of two additional lines alongside the G.W.R. main line. This is estimated to cost £2,135,000, of which £1,655,000 will be incurred by the Great Western and £480,000 by London Transport. One of the most important additions to the original scheme is the electrification between Fenchurch Street and Stratford. Mr. Frank Pick, Vice-Chairman of the London Passenger Transport Board, in the course of his evidence before the Committee on Wednesday, referred to the extension of the Central London tube from Liverpool Street to Stratford, and explained that part of the programme was the lengthening of platforms and improvement of signalling on the existing tube so that eight-car trains could be run on it, thereby enabling 40 trains an hour to be run instead of 32 and increasing the capacity of the line by 67 per cent. A conservative estimate of the additional net revenue from the scheme as a whole was £1,286,500, or 3·04 per cent. on its cost, after a few years, which would meet charges on capital raised, under Government guarantee.

British and Irish Traffic Returns

GREAT BRITAIN	Totals for 12th Week			Totals to Date		
	1936	1935	Inc. or dec.	1936	1935	Inc. or Dec
	£	£	£	£	£	£
L.M.S.R. (6,917 mls.)						
Passenger-train traffic...	395,000	378,000	+ 17,000	4,423,000	4,388,000	+ 35,000
Merchandise, &c. ...	506,000	471,000	+ 35,000	5,522,000	5,322,000	+ 200,000
Coal and coke ...	262,000	261,000	+ 1,000	3,377,000	3,209,000	+ 168,000
Goods-train traffic ...	768,000	732,000	+ 36,000	8,899,000	8,531,000	+ 368,000
Total receipts	1,163,000	1,110,000	+ 53,000	13,322,000	12,919,000	+ 403,000
L.N.E.R. (6,333 mls.)						
Passenger-train traffic...	261,000	248,000	+ 13,000	2,966,000	2,959,000	+ 7,000
Merchandise, &c. ...	358,000	329,000	+ 29,000	3,832,000	3,719,000	+ 113,000
Coal and coke ...	249,000	247,000	+ 2,000	3,111,000	2,938,000	+ 173,000
Goods-train traffic ...	637,000	576,000	+ 31,000	6,943,000	6,657,000	+ 286,000
Total receipts	868,000	824,000	+ 44,000	9,909,000	9,616,000	+ 293,000
G.W.R. (3,746½ mls.)						
Passenger-train traffic...	157,000	153,000	+ 4,000	1,854,000	1,843,000	+ 11,000
Merchandise, &c. ...	199,000	189,000	+ 10,000	2,196,000	2,134,000	+ 62,000
Coal and coke ...	108,000	111,000	− 3,000	1,363,000	1,306,000	+ 57,000
Goods-train traffic ...	307,000	300,000	+ 7,000	3,559,000	3,440,000	+ 119,000
Total receipts	464,000	453,000	+ 11,000	5,413,000	5,283,000	+ 130,000
S.R. (2,154 mls.)						
Passenger-train traffic...	247,000	241,000	+ 6,000	2,862,000	2,809,000	+ 53,000
Merchandise, &c. ...	64,500	63,000	+ 1,500	685,500	700,500	− 15,000
Coal and coke ...	35,500	35,000	+ 500	451,500	418,500	+ 33,000
Goods-train traffic ...	100,000	98,000	+ 2,000	1,137,000	1,119,000	+ 18,000
Total receipts	347,000	339,000	+ 8,000	3,999,000	3,928,000	+ 71,000
Liverpool Overhead ... (6¼ mls.)	1,018	1,103	− 85	13,392	13,074	+ 318
Mersey (4½ mls.) ...	4,044	3,863	+ 181	49,797	48,814	+ 983
*London Passenger Transport Board ...	546,200	529,100	+ 17,100	20,610,500	20,230,000	+ 380,500
IRELAND						
Belfast & C.D. pass. (80 mls.)	1,759	1,696	+ 63	20,273	20,443	− 170
,, ,, goods	607	547	+ 60	5,979	5,578	+ 401
,, ,, total	2,366	2,243	+ 123	26,252	26,021	+ 231
†Great Northern pass. (543 mls.)	9,100	9,050	+ 50	86,000	83,700	+ 2,300
,, ,, goods	10,050	9,750	+ 300	104,850	100,150	+ 4,700
,, ,, total	19,150	18,800	+ 350	190,850	183,850	+ 7,000
†Great Southern pass. (2,076 mls.)	30,198	32,701	− 2,503	294,862	285,268	+ 9,594
,, ,, goods	42,588	39,437	+ 3,151	452,600	431,567	+ 21,033
,, ,, total	72,786	72,138	+ 648	747,462	716,835	+ 30,627

* 38th week, the receipts for which include those undertakings not absorbed by the L.P.T.B. in the corresponding period last year; last year's figures are, however, adjusted for comparative purposes
† 11th week.

British and Irish Railways Stocks and Shares

Stocks	Highest 1935	Lowest 1935	Prices Mar. 25, 1936	Prices Rise/Fall
G.W.R.				
Cons. Ord. ...	55½	44½	47½	—
5% Con. Prefce. ...	124	108	119½	—
5% Red.Pref.(1950)	117	106¾	108½	—
4% Deb.	118½	108	114½	—
4¼% Deb. ...	122	110	117½	—
4½% Deb. ...	129½	118	127½	—
5% Deb.	140¼	130	140½	—
2½% Deb.... ...	82¼	68½	77	—
5% Rt. Charge ...	137	128	134½	—
5% Cons. Guar. ...	136¾	120½	129½	− 1
L.M.S.R.				
Ord.	25 5/16	16	22	—
4% Prefce. (1923)	58¼	43½	66	—
4% Prefce. ...	87½	73½	83½	—
5% Red.Pref.(1955)	107	97¾	105½	—
4% Deb.	110¼	99½	109	+ ½
5% Red.Deb.(1952)	119 11/16	111 5/16	118½	—
4% Guar.... ...	105⅝	95½	103½	+ ½
L.N.E.R.				
5% Pref. Ord. ...	15⅞	8¼	10	—
Def. Ord.	7 9/16	4¾	5½	—
4% First Prefce....	74¾	48	63½	+ ½
4% Second Prefce.	31⅝	16¼	24	− ½
5% Red.Pref.(1955)	92¼	71	90½	+ 2
4% First Guar. ...	103 11/16	93	101	+ ½
4% Second Guar.	98¾	82½	92½	—
3% Deb.	86	75	81½	+ ½
4% Deb.	109¼	98½	107½	+ 1
5% Red.Deb.(1947)	118½	106½	112½*	—
4½% Sinking Fund Red. Deb.	112½	108	109½	—
SOUTHERN				
Pref. Ord.... ...	87½	69⅝	92	+ 1
Def. Ord. ...	25 15/16	16¾	23	—
5% Prefce. ...	124	108¼	119½	—
5% Red.Pref.(1964)	117¾	109½	118½	+ 2
5% Guar. Prefce.	136½	121½	131½	− 1
5% Red.Guar.Pref. (1957)	121¼	112½	116½	—
4% Deb.	116¾	107	113½	—
5% Deb.	138	130¼	138½	—
4% Red. Deb. 1962–67	115	106½	115½	—
BELFAST & C.D.				
Ord.	9	4	9	—
FORTH BRIDGE				
4% Deb.	111¼	104½	104½	—
4% Guar.... ...	109⅞	104	104½	—
G. NORTHERN (IRELAND)				
Ord.	20	7	15	− 1
G. SOUTHERN (IRELAND)				
Ord.	57½	14½	45½	—
Prefce.	50	25¼	53	+ 3½
Guar.	88¾	51¼	83	− 9¼
Deb.	86¼	70	87¾	− ¾
L.P.T.B.				
4½% "A" ...	130	119¾	124½	—
5% "A" ...	139¾	130	134½	—
4½% "T.F.A." ...	113¾	108	110	—
5% "B"	131½	122¾	127	—
"C"	109½	91	105	—
MERSEY				
Ord.	23⅛	9¼	26½	− 1
4% Perp. Deb. ...	100½	93½	97½	—
3% Perp. Deb. ...	75½	67	76	—
3% Perp. Prefce.	62	47¼	64½	—

* ex dividend

CONTRACTS AND TENDERS

Wagons for Gold Coast

The Gloucester Railway Carriage & Wagon Co. Ltd. has received an order from the Crown Agents for the Colonies for 29 bogie covered goods wagons for the 3-ft. 6-in. gauge lines of the Gold Coast Government Railways.

King's Cross Goods Depot Improvements

The L.N.E.R. has decided to remodel the King's Cross goods depot with a view to improving the facilities for traders and to accelerating the handling of traffic An initial contract has been placed with G. A. Fillat & Son Ltd., of Nottingham. When the scheme, which involves the transposition of the incoming and outgoing sheds, is completed, it will be possible to unload simultaneously from 214 wagons without interruption of operation. Most of the sidings will be relaid, and on the despatch side platform accommodation for 200 wagons will be provided. New automatic cart weighbridges are to be installed, together with a separate mess room and accommodation for the large staff employed on cartage work.

Joseph Sankey & Sons Ltd. has received an order for 24 standard platform luggage trucks for the Central Argentine Railway.

The South African Railways & Harbours Administration has placed an order with Henschel & Sohn A.G., of Kassel, Germany, for 16 Class 15-E locomotives with standard boilers, No. 3.B. The total value of the contract is £124,344.

The South African Railways & Harbours Administration has also placed a contract with Bellamy & Lamble, Johannesburg (for the Berliner Maschinenbau A.G.—Vormals L. Schwartskopff) for eight Class 15-E locomotives with standard boilers No. 3.B. The total value of the contract is £59,760.

Locomotive Boilers for India

The Jodhpur Railway Administration has placed orders for superheated locomotive boilers, to the inspection of Messrs. Rendel, Palmer & Tritton, as follows :—

W. G. Bagnall & Co. Ltd., two boilers for P. & M. class locomotives.

Kitson & Co. Ltd., one boiler for FO class locomotive.

The South Indian Railway has placed orders, to the inspection of Messrs. Robert White & Partners, as follow :—

John Walsh & Co., 400 steel panel sheets for carriages.

The Superheater Co. Ltd., 150 superheater elements for metre gauge locomotives.

Metropolitan-Cammell Carriage & Wagon Co. Ltd., 100 carriage and wagon screw couplings.

The Bengal-Nagpur Railway Administration has placed the following orders :—

Howell & Co. Ltd., 4,500 steel boiler tubes, Aquacidox quality.

Blaenavon Co. Ltd., 150 steel engine tyres.

James Archdale & Co. Ltd., one radial drilling machine.

D. Wickham & Co. Ltd. has received an order from the Central Argentine Railway for 23 motor-driven gang trolleys.

Siamese Locomotive Order for Japan

Mitsui Bussau Limited, on behalf of the Japanese Car & Locomotive Makers' Association, is receiving the order for the eight Mikado type locomotives, for which tenders were recently invited by the Siamese State Railways.

The Associated Equipment Co. Ltd. has received the following orders from railway and railway-associated road transport operators :—

London Passenger Transport Board, 50 oil-engined Q type single-decked passenger vehicles, and 50 oil-engined Regals.

City of Oxford Motor Services Limited, six oil-engined Regents and three oil-engined Regals.

Northern General Transport Co. Ltd., 25 oil-engined Regals.

Egyptian Government, three oil-engined Motors.

Wellford & Co. Ltd. has received an order for 1,220 steel spiral springs for electric stock for the Buenos Ayres Western Railway.

The Canton Hankow Railway has placed orders, to the inspection of Messrs. Fox & Mayo, as follow :—

Butler Machine Tool Co. Ltd., general purposes crank shaper.

Henry Broadbent Limited, sliding, surfacing, and screw-cutting gap bed lathe.

Stewarts and Lloyds Limited, steel piping.

Priestman Bros. Ltd., two grab dredging cranes.

Bitulac Limited, black bituminous paint.

British Coal for Sweden

The Swedish State Railways Administration has bought 102,000 tons of British engine coal at prices ranging between 17s. 10d. and 20s. 8½d. a ton. The kinds in question are : Maude, Hastings, West Hartley Main, Lambton, South Hetton, and Horden.

J. Stone & Co. Ltd. has received an order, to the inspection of Messrs. Rendel, Palmer & Tritton, for 50 16-in. electric roof fans for the Bengal North Western Railway.

Soviet Orders in Great Britain

The orders placed in Great Britain during February, 1936, amounted to £845,079 as compared with £1,121,282 in February, 1935. The table below shows the value of each category of engineering and allied materials purchased in the period under review :—

	February, 1936	February, 1935
Machinery and equipment ..	12,865	530,295
Ferrous alloys and steel	—	36,997
Non-ferrous metals	199,599	213,017
Rubber	248,066	—

The Bombay, Baroda & Central India Railway is calling for tenders, to be received in London by April 17, for the supply of steel material (plates, angles, rounds, &c.).

The Bengal-Nagpur Railway is prepared to receive tenders for six boilers and cylinders for " B " class locomotives. Tenders should be submitted at 132, Gresham House, Old Broad Street, E.C.4, by April 8.

The two 820 b.h.p. triple-car streamlined trains already in service and the eight further sets now under construction, mentioned in the paragraph headed " Nord High-Speed Trains," on page 595 of our *Diesel Railway Traction Supplement* for March 20 last, were, and are, being built by the Société Franco-Belge de Matérial de Chemins de Fer, of Raismes (Nord), France. The same firm has also built the Garratt locomotive described on pages 615-621 of this issue.

Indian Imports of Locomotive and Machine Tool Equipment

For the nine months ended December 31, 1934, and December 31, 1935, respectively, the following were the values in lakhs of rupees of imports into India of locomotive and machine tool equipment : Railway locomotives and tenders and parts, 33·1 and 43·7 ; boilers, 32·0 and 50·4 ; metal-working machinery (including machine tools), 11·2 and 13·3. The increase in the imports of railway locomotives is about 30 per cent. on the earlier period, and the United Kingdom share amounted to Rs. 37 lakhs, as compared with Rs. 26·2 lakhs during the same period of 1934.

Forthcoming Events

Mar. 27 (*Fri.*).—G.W.R., at Queen's Hall, Langham Place, London, W.1, 7.45 p.m. Smoking Concert.

L.N.E.R. (London) Musical Society, at Hamilton Hall, Liverpool Street, E.C.2, 8 p.m. Bohemian Concert.

Mar. 31 (*Tues.*).—Institute of Transport (Metropolitan Graduate), at Inst. of Electrical Engineers, Savoy Place, W.C.2, 6 p.m. "The Legal Regulation of Goods Road Transport," by Mr. C. King.

Institution of Locomotive Engineers (Manchester Centre), at 36, George Street, Manchester, 7 p.m. "New 4-8-4 Locomotives for the Chinese National Railways," by G. Collingwood.

Railway Benevolent Institution, at Connaught Rooms, Great Queen Street, London, W.C.2, 6.45 for 7.15 p.m. Anniversary Festival Dinner.

Apr. 1 (*Wed.*).—Industrial Transport Association, at St. Ermin's Restaurant, Caxton Street, London, S.W.1, 1 p.m. Annual Luncheon.

Apr. 2 (*Thurs.*).—Railway Club, at Royal Scottish Corporation Hall, Fetter Lane, London, E.C.4, 7.30 p.m. "London to Southampton and Beyond," by Mr. C. Anderson.

Southern Railway (London) Lecture and Debating Society, at Chapter House, St. Thomas's Street, London Bridge, S.E.1, 5.45 p.m. "The Trader and the Railway Companies," by Mr. E. Hilder.

Apr. 3 (*Fri.*).—Institute of Transport (Birmingham Graduate), at Imperial Hotel, 6.30 p.m. Annual General Meeting.

Institute of Transport (Leeds), at Town Hall, 6.30 p.m. " British Shipping to the Far East," by Mr. F. Grosvenor.

Institute of Transport (London), at Connaught Rooms, Great Queen Street, W.C.2, 6.30 for 7 p.m. Annual Dinner.

Institute of Transport (Nottingham Graduate), at Guildhall, 7 p.m. Annual General Meeting.

Institution of Mechanical Engineers, Storey's Gate, London, S.W.1, 7 p.m. Informal Meeting.

OFFICIAL NOTICES

Bengal-Nagpur Railway Co. Ltd.

THE Directors are prepared to receive Tenders for :—
SIX BOILERS AND CYLINDERS FOR B CLASS ENGINES.

Specification and Form of Tender can be obtained at the Company's Offices, 132, Gresham House, Old Broad Street, London, E.C.2, on or after Wednesday, 25th March, 1936.

A fee of 20s. will be charged for each copy of the Specification, which is not returnable.

Tenders must be submitted not later than Noon on Wednesday, 8th April, 1936.

The Directors do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right of reducing or dividing the order.

By Order of the Board,
T. R. WYNNE,
Managing Director.

Railway Materials & Equipment Manufacturers

ADVERTISER desires active Directorship in an established concern, Birmingham or London Districts. Previous works and selling experience among Home and Foreign Railways. Good connection rolling stock builders, &c. Could probably introduce a strong Sales Organisation if required. Age 45. Audited accounts essential. Capital available, £10,000. Please communicate with DOCKER, HOSGOOD & Co., 10, Newhall Street, Birmingham, in first instance.

Crown Agents for the Colonies

COLONIAL GOVERNMENT APPOINTMENTS

APPLICATIONS from qualified candidates are invited for the following post :—

ASSISTANT ENGINEER required by the Government of Nigeria for the Railway Department for two tours of 12 to 18 months. Salary £540—£30—£720 a year. Free passages and quarters and liberal leave on full salary. Candidates, aged 23 to 35, must be Corporate Members of the Institution of Civil Engineers and be experienced in bridge and reinforced concrete construction.

Apply at once by letter, stating age, whether married or single, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London, S.W.1, quoting M/4051.

The "Queen Mary" Traffic on Clydeside

(From our Glasgow correspondent)

When the *Empress of Britain* passed from the shipyard to the sea five years ago the L.M.S.R. planned to run two trains for the benefit of sightseers desiring to proceed to vantage points on the river. So far did the company underestimate the public interest in the novel event that it had to press ten more trains into service to deal with the 11,000 passengers who presented themselves at the station. The railway companies were not taken by surprise when the *Queen Mary* made the same journey on Tuesday last. Both the L.M.S.R. and L.N.E.R. played the leading role in transporting crowds, the like of which have never been seen in the Clyde area before, and the excursions have to be numbered in hundreds. During the last two weeks scores of specials—local from Lanarkshire stations and long-distance excursions from all parts of Scotland and many parts of England—have carried sightseers to the Clyde. Even railway steamers, which are usually laid-up in their winter quarters until May or June, were temporarily placed in steam and given crews in order that the public might be served to the best advantage.

On Tuesday both the L.N.E.R. and the L.M.S.R. ran novel *de-luxe* excursions. A limited, "green" tourist train left Glasgow (Queen Street) for Bowling on the north bank of the river. The passengers detrained, and embarked on the L.N.E.R. vessel *Jeanie Deans* which is at present laid-up in Bowling Harbour prior to the opening of the summer season. This is probably the first time that a railway steamer not actually in commission has carried fare-paying passengers. The ship, which was decorated with flags, formed an excellent grandstand, the spectators obtaining a close-up view of the liner while it negotiated the notorious Bowling Bend. The cost of this excursion, including lunch on board the ship, was 17s. 6d.

Passengers on the L.M.S.R. *de-luxe* excursion travelled from Glasgow to Wemyss Bay in a train composed entirely of first class carriages. From the latter point the *Duchess of Montrose* took them up the Firth to await the liner's arrival at the Tail o' the Bank. Specials from Manchester and Liverpool led the procession of trains that arrived at Greenock on Tuesday. Shortly afterwards a Rochdale excursion arrived at Gourock. Trains continued to pour into the district until late in the evening. When the offices in Glasgow closed, hundreds of workers crowded down to the coast in the evening excursion trains which were departing at frequent intervals. The L.M.S.R. ran packed steamers from Greenock and Gourock out to the anchored liner from 2.0 o'clock to 9.0 o'clock. L.N.E.R. steamers went over from Craigendoran and Helensburgh on the north side of the Firth. The *Queen Mary*, its long rows of shining portholes reflected on the water, was a sight worth more than the modest shilling which these cruises cost.

During the two weeks prior to the departure of the *Queen Mary* the railways catered excellently for the thousands who wished to view the vessel in John Brown & Company's basin. The L.M.S.R. came to an arrangement with the Campbelltown and Glasgow Steam Packet Joint Stock Company whereby passengers could travel to Gourock by rail, and return to Glasgow by one of the latter company's vessels. L.N.E.R. steamers sailed up the Clyde to the shipyard from Bowling, and cheap travel facilities were given to all stations in the vicinity.

New Norwich Bus Station and Garage

On Tuesday last, the new Surrey Street bus station and garage of the Eastern Counties Omnibus Co. Ltd., a railway-associated concern, was opened by the Lord Mayor of Norwich. The new premises will largely replace the present Thorpe station bus terminus, and the old garage at Thorpe Road is being converted into a repair depot. This arrangement, which combines the bus garage and station, obviates the former practice of running buses empty for nearly a mile between the old garage and Thorpe station. In future only four services will operate from Thorpe station yard, and 30 routes will work from Surrey Street. The new garage, which is spacious, well-lighted, and under a single roof, is designed to hold 170 vehicles. Provision is made for effecting light running repairs only; a power washing plant has been installed. A feature of the adjoining station, which has entrances at both ends, is the use of loudspeakers for traffic control.

Exports of Railway Material from the United Kingdom in February

	Feb., 1936	Feb., 1935	Two Months Ending Feb., 1936	Two Months Ending Feb., 1935
	£	£	£	£
Locomotives, rail	138,162	86,554	236,750	147,502
Carriages and wagons	136,161	67,242	259,115	154,423
Rails, steel	87,010	74,871	125,891	144,472
Wheels, sleepers, fishplates and miscellaneous materials	43,864	114,156	80,526	193,600

Locomotive and rail exports included the following :—

	Locomotives Feb., 1936	Locomotives Feb., 1935	Rails Feb., 1936	Rails Feb., 1935
	£	£	£	£
Argentina	—	—	2,771	8,004
Union of South Africa	—	—	20,552	39,557
British India	19,463	6,715	9,777	33,107

Railway Share Market

Pending further developments in the international political situation there has been a reduction in the volume of business reported in the stock and share markets, and the tendency has been to lower prices. Home railway stocks were affected by general market conditions despite the further good traffic figures, but some of the debenture and preference stocks were bought at rather higher prices by investors who are looking for a continuance of the upward movement in traffics and realise that if this proved the case the investment merits of these stocks would be enhanced considerably.

Southern deferred was out of favour but the preferred were in request and a disposition to exchange into the latter from London Transport "C" was reported. L.M.S. 4 per cent. and 1923 preference were fairly steady following publication of the traffic figures. No doubt if general market conditions had been more buoyant prices would have made a good response to the latter. On the basis of the traffic figures for the current year to-date the L.M.S.R. must now be earning quite 1 per cent. on its ordinary stock. L.N.E.R. junior issues showed virtually no changes of importance but the debentures seemed to be attracting more attention and both the 3 per cent. and 4 per cent. debentures were fractionally higher. Great Western issues displayed little change apart from a moderately higher price for the 4 per cent. debentures. London Transport "C" were easier. The foreign railway market has been idle, and although price-movements were not large, the declines exceeded the gains. B.A.G.S. continued a weak feature and Entre Rios, also declined fractionally. Central Argentine ordinary and 4½ per cent. and 6 per cent. preference were lower and the reaction in the preference was more than a point in each case. The traffics of the Argentine railway companies continue to be disappointing.

Until there is a change for the better in this respect there may be no marked revival of interest in the stocks. Antofagasta and Nitrate Rails came in for further profit-taking. Cordoba Central debentures remained active despite the continued deferring of an interest payment. It is currently reported that a good deal of buying is from South America.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

	Railways	Miles open 1935-36	Week Ending	Traffics for Week: Total this year	Traffics for Week: Inc. or Dec. compared with 1935	No. of Weeks	Aggregate Traffics to Date: Totals: This Year	Aggregate Traffics to Date: Totals: Last Year	Aggregate Traffics to Date: Increase or Decrease	Shares or Stock	Prices: Highest 1935	Prices: Lowest 1935	Prices: Mar. 25, 1936	Yield (See Note)
				£	£		£	£	£					
South & Central America.	Antofagasta (Chili) & Bolivia	834	22.3.36	13,670	+ 2,390	12	166,020	145,360	+ 20,660	Ord. Stk.	23	14 15/16	22	Nil
	Argentine North Eastern	753	21.3.36	7,538	+ 631	38	296,006	274,482	+ 21,524	„	7	4	5	Nil
	Argentine Transandine	—	—	—	—	—	—	—	—	A. Deb.	49 1/2	30	47 1/2	8 7/16
	Bolivar	174	Feb., 1936	6,650	+ 50	9	12,150	12,450	— 300	6 p.c. Deb.	13	5	10	Nil
	Brazil	—	—	—	—	—	—	—	—	Bonds.	14	11	14	3 9/16
	Buenos Ayres & Pacific	2,806	21.3.36	101,586	— 70	38	3,104,859	2,835,916	+ 268,943	Ord. Stk.	101 1/2	47/8	81/2	Nil
	Buenos Ayres Central	190	7.3.36	$94,100	+ $2,600	36	$4,109,500	$4,025,900	+ $83,600	Mt. Deb.	21	10	14 1/2	Nil
	Buenos Ayres Gt. Southern	5,084	21.3.36	143,537	— 35,943	38	4,960,497	5,446,138	— 485,641	Ord. Stk.	27	13 1/2	18	Nil
	Buenos Ayres Western	1,930	21.3.36	48,179	— 2,087	38	1,685,925	1,673,678	+ 12,247	„	24	10	14 1/2	Nil
	Central Argentine	3,700	21.3.36	107,638	— 10,180	38	4,587,355	4,478,674	+ 108,681	„	17 7/8	7	11	Nil
	Do.	—	—	—	—	—	—	—	—	Dfd.	9	3 1/4	6 1/2	Nil
	Cent. Uruguay of M. Video	273	14.3.36	13,441	+ 3,664	37	400,097	529,948	— 129,851	Ord. Stk.	8 1/2	3	7	Nil
	Do. Eastern Extn.	311	14.3.36	2,574	+ 598	37	74,290	70,335	+ 3,955	—	—	—	—	—
	Do. Northern Extn.	185	14.3.36	1,601	+ 460	37	51,860	38,242	+ 13,618	—	—	—	—	—
	Do. Western Extn.	211	14.3.36	935	+ 353	37	32,688	29,401	+ 3,287	—	—	—	—	—
	Cordoba Central	1,218	21.3.36	22,860	— 850	38	1,081,860	1,081,150	+ 710	Ord. Inc.	4	1	2 1/2	Nil
	Costa Rica	188	Jan., 1936	11,558	— 5,258	31	92,279	115,867	— 23,588	Stk.	35	30	35 1/2	5 5/8
	Dorada	70	Feb., 1936	12,300	+ 1,300	9	25,600	21,500	+ 4,100	1 Mt. Db.	103 5/8	102 1/2	104 1/2	5 1/4
	Entre Rios	810	21.3.36	8,819	— 1,341	38	417,066	473,218	— 56,152	Ord. Stk.	15	6 1/2	9 1/2	Nil
	Great Western of Brazil	1,082	21.3.36	9,700	+ 700	12	118,200	127,700	— 9,500	Ord. Sh.	1/2	5/16	1/2	Nil
	International of Cl. Amer.	794	Jan., 1936	$501,540	+ $72,063	5	$501,540	$429,477	+ $72,063	—	—	—	—	—
	Interoceanic of Mexico	—	—	—	—	—	—	—	—	1st Pref.	1/2	3/32	1/2	Nil
	La Guaira & Caracas	22 1/4	Feb., 1936	4,225	+ 825	9	8,650	6,500	+ 2,150	Stk.	8 1/2	8	8 1/2	Nil
	Leopoldina	1,918	21.3.36	18,574	— 334	12	216,948	209,666	+ 7,282	Ord. Stk.	8 1/2	2 1/2	7	Nil
	Mexican	483	21.3.36	$254,500	+ $21,600	12	$2,908,900	$2,676,400	+ $232,500	„	1 1/2	1/4	1	Nil
	Midland of Uruguay	319	Feb., 1936	8,176	+ 2,203	35	56,312	85,088	— 28,776	„	1 1/2	1 1/2	1 1/2	Nil
	Nitrate	401	15.3.36	6,615	+ 2,469	11	35,969	30,491	+ 5,478	Ord. Sh.	64/-	42/-	2 1/2	Nil
	Paraguay Central	274	14.3.36	$2,176,000	+ $943,000	37	$76,931,000	$38,831,000	+ $38,100,000	Pr. Li. Stk.	80 1/2	60	77	7 5/16
	Peruvian Corporation	1,059	Feb., 1936	78,640	+ 15,819	35	616,056	499,646	+ 116,410	Pref.	10 5/8	67/16	13	Nil
	Salvador	100	14.3.36	¢28,900	— ¢3,700	37	¢698,096	¢721,902	— ¢23,806	Pr. Li. Db.	65	61	65	7 11/16
	San Paulo	153 1/2	15.3.36	26,067	+ 1,474	11	309,448	238,887	+ 70,561	Ord. Stk.	80	35	55 1/2	4 1/2
	Taltal	164	Feb., 1936	4,570	— 695	35	28,485	22,707	+ 5,778	Ord. Sh.	11 1/16	1 1/8	1 5/8	7 1/4
	United of Havana	1,353	21.3.36	46,782	+ 3,429	38	833,211	861,352	— 28,141	Ord. Stk.	3 1/16	1	3	Nil
	Uruguay Northern	73	Feb., 1936	807	+ 246	35	6,367	9,007	— 2,640	Deb. Stk.	4 1/2	2 15/16	4 1/2	Nil
Canada.	Canadian National	23,684	14.3.36	674,078	+ 46,904	11	6,496,694	6,156,587	+ 340,107	—	—	—	—	—
	Canadian Northern	—	—	—	—	—	—	—	— 4 p.c.	Perp. Dbs.	78 5/8	52 1/2	68	5 7/8
	Grand Trunk	—	—	—	—	—	—	—	—	4 p.c. Gar.	103 5/8	93	103 1/2	3 7/8
	Canadian Pacific	17,260	14.3.36	528,200	+ 87,600	11	4,731,600	4,273,600	+ 458,000	Ord. Stk.	14 1/16	8 5/4	13	Nil
India.†	Assam Bengal	1,329	29.2.36	33,180	+ 215	48	1,157,971	1,309,484	— 151,513	Ord. Stk.	92 1/8	77 1/2	85 1/2	3 1/2
	Barsi Light	202	29.2.36	2,850	+ 173	48	130,365	127,522	+ 2,843	Ord. Sh.	105	77 1/2	73 1/2	6 15/16
	Bengal & North Western	2,112	10.3.36	80,401	— 6,062	49	1,222,880	1,220,503	+ 2,377	Ord. Stk.	30 11/2	291	304 1/2	5 1/4
	Bengal Dooars & Extension	161	29.2.36	3,174	+ 555	48	128,781	143,838	— 15,057	„	127 1/2	122	125 1/2	5 9/16
	Bengal-Nagpur	3,268	10.2.36	175,575	— 19,327	45	5,496,754	5,117,688	+ 379,066	„	105	100 5/16	102 1/2	3 7/8
	Bombay, Baroda & Cl. India	3,072	20.3.36	278,700	+ 40,200	51	8,109,150	8,067,450	+ 41,700	„	115 1/4	110	112 1/2	5 5/16
	Madras & Southern Mahratta	3,230	29.2.36	132,900	+ 9,036	48	4,909,549	5,081,900	— 172,351	„	128 1/2	113 7/8	115 1/2	7 1/4
	Rohilkund & Kumaon	572	10.3.36	17,642	— 3,072	49	245,059	245,852	— 793	„	294	262	300 1/2	5 5/16
	South India	2,526	20.2.36	102,113	— 16,543	46	3,491,106	3,695,204	— 204,098	„	119 3/4	104 1/4	106 1/2	7 1/16
Various.	Beira-Umtali	204	Jan., 1936	61,199	— 3,320	17	254,392	245,504	+ 8,888	—	—	—	—	—
	Bilbao River & Cantabrian	15	Feb., 1936	2,152	+ 91	9	3,469	4,310	— 841	—	—	—	—	—
	Egyptian Delta	622	10.3.36	6,198	+ 90	49	238,093	228,250	+ 9,843	Prf. Sh.	2	15/8	1 3/4	5 11/16
	Great Southern of Spain	104	14.3.36	1,103	— 221	11	12,904	20,155	— 7,251	Inc. Deb.	3 1/2	2	3 1/2	Nil
	Kenya & Uganda	1,625	Feb., 1936	245,527	+ 26,405	9	478,026	459,598	+ 18,428	—	—	—	—	—
	Manila	—	—	—	—	—	—	—	—	B. Deb.	48	36	48	7 5/16
	Mashonaland	913	Jan., 1936	97,871	— 23,922	17	410,904	464,048	— 53,144	1 Mg. Db.	104 1/4	100	104 1/2	4 3/4
	Midland of W. Australia	277	Jan., 1936	14,828	+ 1,651	31	98,451	99,125	— 674	Inc. Deb.	98 3/4	93	94 1/2	5 5/16
	Nigerian	1,905	1.2.36	47,867	+ 169	44	1,576,436	1,671,834	— 95,398	—	—	—	—	—
	Rhodesia	1,538	Jan., 1936	180,459	— 15,308	17	756,445	752,419	+ 4,026	4 p.c. Db.	105 1/2	101	105	3 15/16
	South African	13,246	29.2.36	599,388	+ 50,158	48	27 468,428	24,712,273	+ 2,756,155	—	—	—	—	—
	Victoria	4,728	Nov., 1935	823,035	— 25,801	21	3,959 297	3,881,659	+ 77,638	—	—	—	—	—
	Zafra & Huelva	112	Jan., 1936	10,488	— 895	5	10,488	11,383	— 895	—	—	—	—	—

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1/16

† Receipts are calculated @ 1s. 6d. to the rupee. § ex dividend. Salvador and Paraguay Central receipts are in currency.

The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the Sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements from July 1 onwards are based on the current rates of exchange and not on the par value